Pests

AND THEIR CONTROL

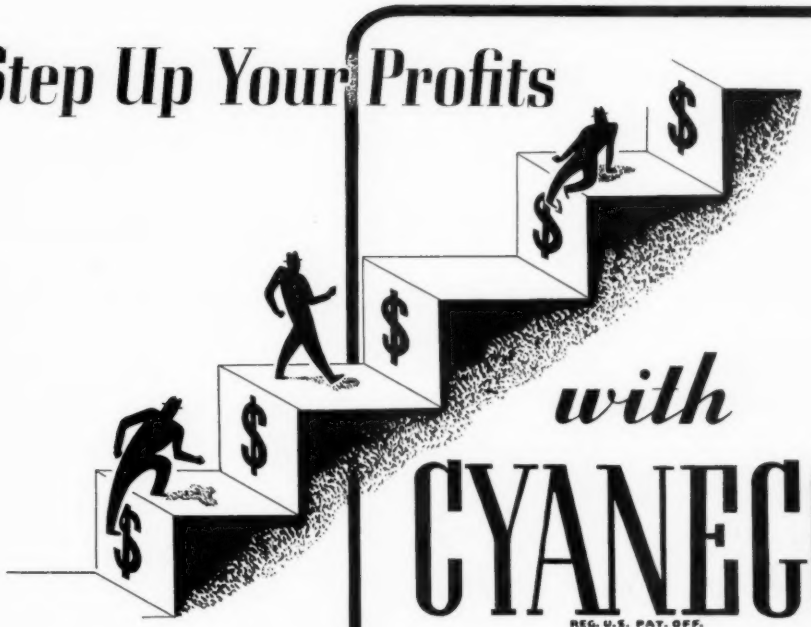
1940
APRIL
VOL. 8 NO. 4

ORGAN OF THE PEST CONTROL INDUSTRY

Exterminators
Fumigators
Termite Control Operators
Entomologists
Insecticide and Supply Mfgrs.

Step Up Your Profits with CYANEGG

REG. U.S. PAT. OFF.



Right now, with a planned sales program and "Cyanegg"* — P.C.O.'s can step up their sales in both the household and industrial fields.

"Cyanegg" is the most economical source of HCN gas, the most effective fumigant known today. Use it to be certain that all your fumigation jobs are thoroughly effective, that your customers are pleased.

*Reg. U. S. Pat. Off.

★

The "CAVALCADE OF AMERICA" Broadcast Every Tuesday Evening at 9:00 E.S.T. NBC Coast-to-Coast Network.

★

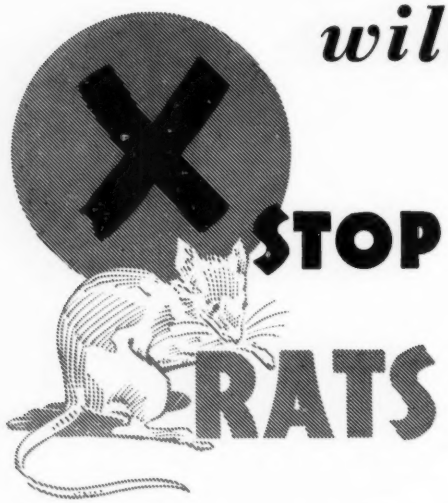
Simple and practical to use "Cyanegg" —HCN Fumigation does not require any expensive equipment—just a few crocks or barrels or the Cyanide Generator. Effective dosages can be generated just where they are needed.

Start your sales climbing *now*. Put "Cyanegg" to work for you. For any further information, write:

DU PONT

E. I. DU PONT DE NEMOURS & CO. (INC.)
The R. & H. Chemicals Dept.
Wilmington, Delaware
District Sales Offices: Baltimore, Boston, Charlotte, Chicago, Cleveland, Kansas City, Newark, New York, Philadelphia, Pittsburgh, San Francisco

MULTI-LURE BAIT *will*



A deadly rodent poison which is secreted in an irresistible combination of vital food lures. MULTI-LURE comes ready-mixed—a restless life-like mixture that actually seems to be creeping up on the rats and mice.

SELL YOUR COMPLETE LINE OF SANITARY SUPPLIES **UNDER YOUR OWN LABEL**

Fuld Bros. catalog contains information about hundreds of Disinfectants, Deodorants, Insecticides, Cleaners, Floor Maintenance and kindred products which you could profitably feature. Write for the complete catalog and prices.

FULD MAKES IT FOR THE LEADERS

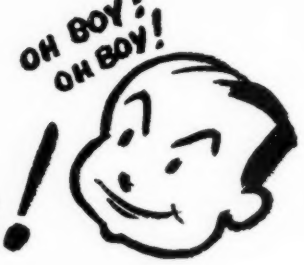
•

FULD BROS.

702-710 S. Wolfe St. Baltimore, Md.

Sales Offices:
Seattle - Kansas City - San Francisco - Boston

Metropolitan New York Office:
127 Troutman St., Brooklyn, N. Y.



Relax!

"It's a grand and glorious feeling!" to be able to sit back and relax, knowing absolutely that the Penn-Drake Insecti-sol you use for your insecticide base will always remain 100% volatile and odorless.

The reason for the permanent purity of Penn-Drake Insecti-sol is quite simple. We don't try to cover up or neutralize the trouble-makers—we *remove* them! The exclusive Penn-Drake Karnsite process, which goes far beyond ordinary refining methods, eliminates every harmful impurity that the most stringent tests can discover.

With over sixty years' refining experience in the richest oil fields in the country, we can serve you efficiently and economically. Our research chemists have perfected an exclusive refining process that gives Penn-Drake Insecti-sol supreme quality. You can depend on it to retain the distinctive features of your insecticide. Its greater stability and absolute resistance to oxidation guarantee constant uniformity.

Let us send information on how to reduce your manufacturing costs and cut losses from deterioration. Write for full information on Penn-Drake Insecti-sol.

PENNSYLVANIA REFINING CO.

General Offices: BUTLER, PA.

REFINERIES AT
Titusville, Pa. and Karns City, Pa.

WAREHOUSE STOCKS MAINTAINED IN:
New York, Chicago, Detroit, Los Angeles, St. Louis, Atlanta, Boston, Scranton and Cleveland

penn drake
petroleum products

PENN-DRAKE PRODUCTS
U. S. P. White Oils and Technical Oils... Petrolatums... INSECTI-SOL ...Waxes... Naphthas ... Rubber Solvents Motor oils and greases ... High flash lubricants... Industrial lubricants and greases

Pests

and Their CONTROL

Exterminators, Fumigators, Termite Control Operators, Entomologists, Insecticide and Supply Manufacturers

COOPERATING WITH NATIONAL PEST CONTROL ASSOCIATION

AL COSSETTA, *Editor*
D. E. RECK, *Associate Editor*

MAX ROSENTHAL, *National Advertising Rep.*
126 Lexington Ave., N. Y. City, Phone Mu. 4-9000

PUBLICATION OFFICE, 512 EAST 14th ST., KANSAS CITY, MO.

VOL. 8, NO. 4 | APRIL, 1940 | ESTABLISHED 1933

NATIONAL PEST CONTROL ASSOCIATION, INC.

PRESIDENT
Walter S. McCloud, 612 North Michigan Ave. ..... Chicago, Ill.

REGIONAL VICE-PRESIDENTS
Max J. Levy, 2399 University St. ..... Minneapolis, Minn.
Otto Orkin, Post Office Box 647 ..... Atlanta, Ga.
Albert M. Akers, 2122 E. 2nd St. ..... Cleveland, Ohio
Charles W. Houghton, 31 India St. ..... Boston, Mass.
Alfred Zimmern, 5007 Lindsley Ave. ..... Dallas, Texas

SECRETARY
William O. Buettner, 3019 Fort Hamilton Pwky. ..... Brooklyn, N. Y.

TREASURER
George R. Elliott, 58 Front St. ..... Worcester, Mass.

DIRECTORS - Three Years, 1939-1942
Charles Denny ..... St. Louis, Mo.
Edward H. Arnott ..... Indianapolis, Ind.
Robert E. Hackley ..... Palo Alto, Calif.
Gilbert M. Stover ..... Baltimore, Md.
Glen H. Burnett ..... Atlanta, Ga.
William Phippard ..... Cincinnati, Ohio
Louis Gatto ..... Beaver Falls, Pa.

DIRECTORS - Two Years, 1939-1941
Walter B. Hill ..... Memphis, Tenn.
F. E. Bohman ..... Hartford, Conn.
Martin Mayer ..... Philadelphia, Pa.
John P. Linn ..... Omaha, Nebr.
Jesse M. Miller ..... Hollywood, Calif.
Ernest Barber ..... New Orleans, La.
Ray V. Bechtel ..... Detroit, Mich.

DIRECTORS - One Year, 1939-1940
P. Calvert Cissell ..... Washington, D. C.
Al Cossetta ..... Kansas City, Mo.
Robert W. Laing ..... Cleveland, Ohio
Irving H. Josephson ..... New York, N. Y.
Harry J. Hammond ..... Milwaukee, Wis.
A. T. Parsons ..... San Mateo, Calif.
J. L. Howell ..... Houston, Texas

CANADIAN REPRESENTATIVE
P. Henry Maheu ..... Montreal, Canada

PAST PRESIDENTS - Ex-Officio Members
William O. Buettner ..... Brooklyn, N. Y.
Thos. C. Raley ..... St. Louis, Mo.
C. Norman Dold ..... Chicago, Ill.
Bartlett W. Eldredge ..... Waltham, Mass.
H. K. Steckel ..... Columbus, Ohio
H. G. Irving Sameth ..... New York, N. Y.

MEMBERSHIP

Three classes of membership: Active, Associated and Allied. ACTIVE MEMBERSHIP includes all firms engaged in any type of Pest Control operations (general extermination, fumigation, termite control, moth proofing) and dues are $15.00 per year. ASSOCIATE MEMBERSHIP includes branch offices of Active members and yearly dues are $10.00. ALLIED MEMBERSHIP includes manufacturers and supply houses.

STATEMENT

The National Association appreciates the co-operation given by way of publicity. The Association is not responsible for articles published unless credited to the Association. The list of officers and directors is published for informational purposes only.

For further details, communicate with

WILLIAM O. BUETTNER, Secretary
3019 Fort Hamilton Parkway ..... Brooklyn, New York

CONTENTS

"Contributed articles in this publication do not necessarily reflect the opinions of the editors. The editors invite discussions, comments and all types of literary material pertaining to pest control and pests from any person interested in the advancement of the field."

Editorial 4-5

University of Missouri Holds First P.C.O. Conference 6

North Central States Entomological Conference 7

Protection of Fabrics and Furs from Clothes Moths and Carpet Beetles 8
By W. M. Hoskins and Marian J. Van Ess

Toxicity of Phosphorus to Cockroaches 12
By F. L. Campbell

A Doctor Looks at Pest Control 13
By Alex J. Jones, M.D.

Properties of Soils Related to Termite Control—Part II 14
By G. L. Hockenyos

More "Candid Camera" Jottings from Third Annual Pest Control Operators' Conference of the Pacific Coast 18

Case Histories as Related to Fumigation Procedures 19
By J. L. Horsfall

What the Pest Control Industry Is Doing for Entomology 23
By W. E. McCauley

What's New in Pest Control—Personals 26

Local Organization News 27

New England Termites 29

Write for These Booklets 30

Published monthly by PESTS, 512 East 14th Street, Kansas City, Missouri. Subscription rate in the United States and Possessions $3.00 per year; Foreign $3.50 per year; Single Copies 25 cents; Bundles of 25 Copies $5.00. Publishers not responsible for unsolicited manuscripts. No Manuscripts will be returned. All advertising copy and contributions must be in our hands by the 15th of the preceeding month of the issue in which they are to appear. Three weeks' advance notice necessary for change of address. Both old and new address must be given.

EDITORIAL

P.C.O. Conference In Missouri

FOR the first time in the history of Missouri the pest control operators gathered together in a meeting at the University of Missouri, Columbia, Missouri, on March 19. This one day meeting demonstrated that the P.C.O.'s of Missouri now realize the tremendous value of a get-together meeting such as that which was held. Thirty P.C.O.'s from various parts of the state were in attendance and great willingness to cooperate was apparent. The concensus of opinion was that it was definitely worth-while and plans for another meeting in May were made.

The P.C.O.'s of Missouri are truly indebted to Dean M. F. Miller, Dr. L. Haseman and the splendid staff of the Department of Entomology of the University of Missouri, as well as the national association, in making this one day conference a real success. Those who attended are deeply grateful to the University of Missouri and to its staff of fine workers for the splendid spirt of cooperation and helpfulness evidenced. We are sure this marks an epoch not only in the friendly relations between competitor operators of Missouri but also between Missouri's entomologists and P.C.O.'s.

America's Economic Nationalism—European Style

"As we go to press we see The Temporary National Economic Committee is holding a series of hearings in Washington on the expansion of interstate trade barriers, revealing a situation which threatens the U. S. with trouble. However, the disease must be diagnosed before it can be cured. This is what the TNEC is helping to do."

IT'S been said no matter how much things change, they always remain the same. Nearly two hundred years ago restrictive trade measures were in effect among the 13 colonies in America. The purpose of these was to build up the "home industry" of each colony as against the others. This made necessary the Federal Union and the Constitution. Due to and since the early depression years of the last decade, some 1,000 laws infringing free trade between the states have been put on the statute books, so that we're just about where we were before the adoption of the Constitution.

Though the Constitution says "no state shall without the consent of Congress, lay any imposts or duties on imports or exports except what may be absolutely necessary for executing its inspection laws" it has been circumvented through trade barriers disguised as inspection laws, quarantine laws, labeling and tax laws, high registration fees, etc.

Certain states have enacted high registration fees on out-of-their state manufactured insecticidal materials. This tends to create a monopoly for the producers within the state with consequent higher prices and no economic justification for them.

What is the result? States discriminated against in turn enact retaliatory laws of a restrictive nature, achieving in effect a stalemate in which all parties lose. This means higher prices for consumers and the resultant corollary of a low standard of living. In the meantime since individual pest control operators, as well as industries as a whole do not operate in a vacuum, lower purchasing power on the part of consumers due to unwarranted higher prices must eventually reflect itself in reduced sales volume. Ironically enough even the state protected monopolistic industries while enjoying a temporary advantage are finding the ill effects of such inhibitive laws piling up in their doorways.

What is being done about it? Aroused to the dangers inherent in the spread of interstate barriers, the Administration launched a program to provide a concrete basis for a nation-wide campaign for their elimination, with Federal regulation a possibility. Three Supreme Court justices in a dissenting opinon recently from a majority decision enjoining Arkansas from imposing a tax on gasoline (in excess of 20 gallons) carried in the fuel tanks of interstate buses if the gasoline were for use in other states, advocated that the courts leave to Congress the question of the constantly increasing barriers to trade among the states. Some of the states have gotten together to eliminate trade obstacles. A publicity campaign, designed to influence the consumers as well as business men to bring pressure to bear on their state legislators, is in progress.

We might even suggest the local and state Pest Control Associations can help by passing resolutions condemning such laws if in operation in their states. If the tendency of trade barriers is not soon stopped, the next step will be cities legislating against each other intrastate, and streets legislating against each other intracity, with eventually "who knows what."

Where Our Industry Fits in This Typhus Picture

NO ONE in his right mind wants to see typhus gain any further headway in our nation. There have been rather serious outbreaks of typhus fever in the southeastern portion of our country during the last few years. In fact, this malady seems to be working its way further north right along. Tennessee and Georgia, it would seem, are the foci of this disease at present.

We all admit that there are diseases which man experiences which are more fatal than typhus. There are epidemics which are much more serious. There have been epidemics of various kinds in our history which are much more serious than the present flare up. However, it is well that cognizance be taken of the present situation and that proper steps be taken to guard the public health before this whole matter gets out of hand. It is much easier to put out a localized small fire than it is to take care of a tremendous conflagration. That is the way we would look at this typhus thing.

There was held in the city of Atlanta recently a meeting of the pest control operators of that city together with their employees at which time Mr. W. H. Edwards, Jr., of the Atlanta Health Department, and Mr. Roy J. Boston, Assistant Engineer of the State Board of Health of Macon, Georgia, addressed the group on this very subject. Mr. Boston showed pictures of the work he has been doing throughout southern Georgia in the matter of rat control, or more properly we should say, ratproofing of buildings to the end that rats will not be present to serve as hosts to typhus carrying fleas. Man seems to get this disease through this means, yet the rats carrying the fleas do not get it. Oddly enough, other types of rodents including mice and squirrels do not seem to carry these fleas in any great quantity and so the rat must take a large share of the blame for the spread of this particular pestilence.

Time and again at recent conventions our industry has stated what no one could deny is a common sense viewpoint of this whole situation. We want to lend every cooperation we can as an industry in any worthy cause such as this. We have steadfastly maintained that if there is a health hazard and especially if infestations are so great that typhus has actually developed, we would like to see educational campaigns carried on that would embody three cardinal principles as follows:

a. **Sanitation** measures by which would be meant a clean-up campaign to remove debris and otherwise clean up conditions so as to eliminate as far as is humanly possible the rat harborages and breeding places.

b. **Ratproofing** mainly by the usual mechanical means in the south and in the north there enters also the picture

of concrete work and other pointing-up along foundations, walls, etc.

c. **Actual extermination**, preferably done by our industry, and then the important thing to remember is that the work is only begun. We must forever keep before us the fact that a maintenance service by means of baiting, trapping, gassing, etc., is necessary from that point on.

One cannot fold his hands, sit back, and say the job is done. A constant vigil must be kept and that is where our industry fits very definitely into the picture, and we must fight if necessary to see that our prerogatives are not usurped by others, especially those less competent to deal with actual pest cases than we are. Who is as competent to deal with a pest control problem as we are?

It is true that most of the firms that compose our industry are more capable of handling an actual control problem than they are in doing ratproofing work. It would be well for us to study this phase of our business and put it into actual practice. Not only can substantial profit be made, which is an incidental item, but definite good can be done for our customers by doing ratproofing on their property.

If you have not familiarized yourself with the article by Mr. B. E. Holsendorf on page 10 of the June, 1939, issue of PESTS, we commend this article to you. It deals with this neglected phase of our business, namely, ratproofing. We are all looking for a means of enlarging our scope of usefulness to our public. Here is one of the best means of accomplishing this that we know anything about. In other words, true ratproofing is keeping out the trouble rather than waiting for it to come in and then take care of it.

In dealing with this whole problem it seems as though we can summarize the modus operandi which our industry should follow with three main divisions.

a. Lend our efforts to any educational campaign which seeks to enlighten the public on the dangers involved in having rats around the premises.

b. We should get together and at all times act as business men should, realizing that we must work cooperatively on such matters.

c. We must diplomatically get the idea of cooperation over to the authorities and at the same time we must have the work that rightfully belongs to us.

The authorities can educate the public but we want the business of actually controlling the pests. We do not want to abdicate in favor of any governmental agency, be it ever so good.

—By C. Norman Dold.

Research

Research has become a major industry in its own right in the United States. Corporation laboratories now spend about $200,000,000 annually and employ 50,000 workers.

Let us draw an analogy. Notwithstanding the millions of dollars property damage due to insects and pests to say nothing about the threat to health, the Bureau of Entomology and Plant Quarantine at Washington, D. C., has the paltry sum of slightly over $25,000 with which it is expected to delve into the manifold unsolved problems of coping with household or structural pests. Either our industry has not made itself felt or the agricultural interests have talked louder. It is said that for one state alone for a comparatively simple study in research over $50,000 was made available. Now is the time to talk with your congressmen and other officials in building up the case of the structural or household pest field.

We are indebted to Walter S. McCloud, President of the National P.C.O. Association for his thoughtfulness in making available to us the pictures he took at the two conferences, those recently held at the Purdue and Louisiana Universities. The group picture that appeared in the February issue and the one that appears in this issue were made possible by Walter. We are sure our readers, as well as we, appreciate this thoughtfulness.

Fumigation Accidents—Causes—Prevention

NOW that the pest control industry is entering upon another fumigation season, and since fumigation casualties can be prevented if proper precautionary measures are taken, we feel a word of caution on the causes and prevention of such accidents is in order.

A recent bulletin issued by one of the leading manufacturers in this field, discloses that a survey of fumigation casualties for the last two years, of which they have a record, discloses the various casualties and the approximate percentage represented by each cause as follows:

"Failure to beat all mattresses, pillows, bedding, clothing and bedroom rugs; test for presence of HCN before allowing tenants to use.....25%

Failure to lock all doors and accessible windows and place warning signs thereon. Inadequately guarded premises during fumigation.....25%

Failure to vacate entire building even though only part is fumigated 20%

Failure to always wear gas mask; keep in perfect condition 20%

Failure to make personal inspection of entire premises immediately before releasing gas.....8%"

While it is generally recognized that it is possible to fumigate and ventilate a house on the same day and allow it to be occupied on the same night, when conditions for ventilation are perfect, namely, temperature, air current, layout of the premises, etc., it is only too apparent that conditions are not always favorable and where there is any doubt whatsoever, to play safe, the pest control operator should not allow a house to be occupied on the night of the day it has been fumigated.

Correction

Triple Threat Against Termites

On page 6 of the March issue there appeared the article "Pest Control Operators Resolve Triple Threat Against Termites." There were no remarks to indicate that this article was written with an eye toward the subterranean termite. This brief note is for the purpose of clarification in that the 1-2-3-3½ point program is concerned with the subterranean termite.

Put This to Action

One of our midwestern firms, in emphasizing the type of services that it will render, offered the following quotation: "Where price is the only consideration, and quality must suffer, let someone else have the business."

Once the better firms throughout the industry take this attitude, and refuse to be stampeded into joining the famous "Alibi Club," it is possible that the example will be followed by others. The outstanding trouble with entirely too many firms is to excuse low prices on meeting competition, when as a matter of fact, this type of competition can be avoided if a determined stand is made by the pest control operator who will place his emphasis on **economy** of **good** service are entitled to the respect of the public.

Household Pest Research

"HOUSE APPROPRIATIONS COMMITTEE" recommends following budgets for the fiscal year 1941 for prosecution of various research and other projects in Agricultural Chemistry:
Insect Pest Survey, $154,790, the same as for this year, but $940 under the budget; Insecticide and Fungicide Investigation, $125,000, a cut of $9,984 from the current fund and $11,174 under estimates; Control Investigations, $72,518, an increase of $5,000 over this year and $4,740 above the estimate.

NOTE: *Do not confuse the above with strictly household pest control research. There is a ridiculously low amount for household pest research.*

University of Missouri Holds First P.C.O. Conference

Columbia, Missouri, March 19, 1940

THUS far in 1940 conferences have been held at Purdue University, University of California and Louisiana State University. Now the "show me" state of Missouri arrives on the scene with one of these invaluable meetings.

On March 19, 1940, under the leadership of Dr. L. Haseman, 30 Missouri P.C.O.'s met at Whittier Hall, University of Missouri, Columbia, Missouri. Dr. Leonard Haseman, Professor of Entomology called the meeting to order at 10:15 A. M. M. F. Miller, Dean of Agriculture, welcomed the P.C.O.'s and outlined briefly the function and facilities of the College of Agriculture. Dean Miller's words of welcome were most cordial, his understanding of the need for pest control service is no doubt a reflection of his close contact with Dr. Haseman and the Department of Entomology. Dean Miller in his genial manner upset all of our ideas as to the formality and stiffness of a college dean and won the praise and admiration of every P.C.O.

The Dean's words of welcome were sincerely spoken and they expressed the earnest desire of the staff at the university to help in every way possible with the building in the state of the best and most effective pest control service in the country.

Chas. Denny of St. Louis, gave the response for the P.C.O.'s and concluded by reading a letter from our national secretary, Mr. Wm. O. Buettner, congratulating the Missouri P.C.O.'s first state meeting. Following this, opportunity was allowed for the operators to get better acquainted, talks also being given by Dr. Haseman, Chas. Denny, James Walker, T. N. Birkett, Geo. D. Jones and Al Cossetta. The remainder of the morning was spent in a round table discussion of various problems. Plans for future meetings were discussed and it was definitely decided to hold another meeting in May.

After an excellent luncheon at Harris Cafe, the meeting resumed at 1:00 p. m., with motion pictures on termites, and termite control. Following the picture a discussion followed on various phases and conditions encountered in termite control.

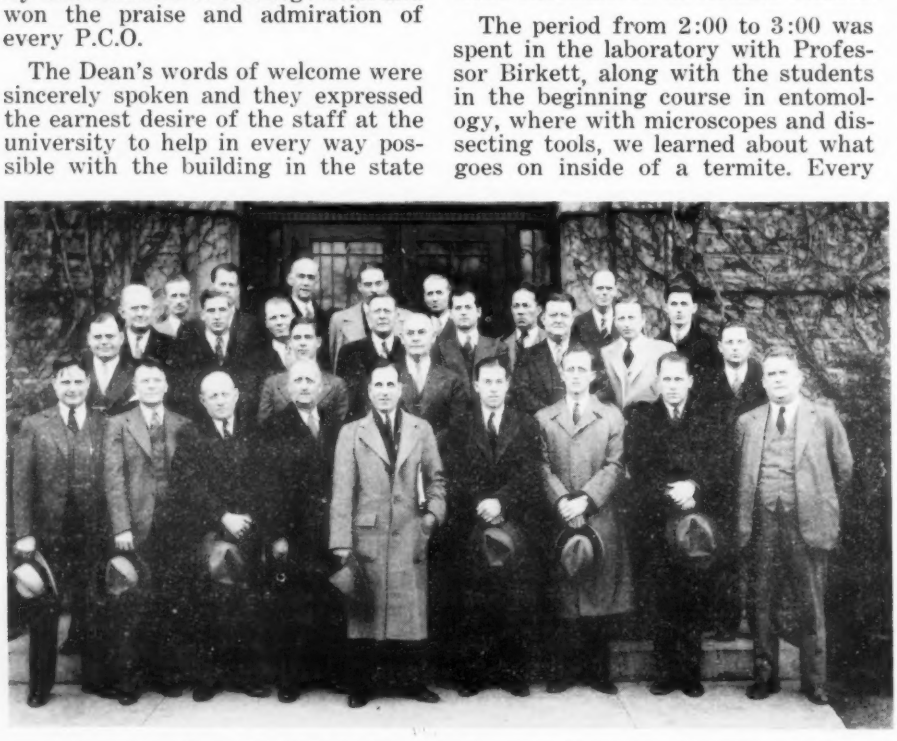
The period from 2:00 to 3:00 was spent in the laboratory with Professor Birkett, along with the students in the beginning course in entomology, where with microscopes and dissecting tools, we learned about what goes on inside of a termite. Every one seemed to feel that the hour contained less than the usual 60 minutes, for we had spent a most interesting and educational hour, being instructed by the freshmen, under the supervision of Prof. Birkett.

At 3:00 we assembled for motion pictures on clothes moths, and carpet beetles; during the picture Dr. Haseman lectured on the life history and points of interest in control. A round table discussion followed on control problems of the two pests.

We feel we can make no more expressive comment on the conference than to quote some of Dr. Haseman's remarks made after the conference was history.

"The future success of any new movement or development is always measured by its leadership and this first conference certainly showed evidence of an abundance of potential leadership. The unusually good attendance from the different parts of the state, coupled with the expressed wish that future similar meetings be held, was evidence of the men's desire to improve their knowledge and service. The willingness to cooperate was well shown in the final selection of the day of the week for the next meeting. While a number preferred some certain day, they were willing to cooperate in selecting a day less convenient for them. This speaks well for the future harmony in the group, a thing most desirable. In my thirty odd years of experience in pest control work in Missouri, I have had the privilege of attending many different meetings, but never have I met with any group which to a man showed such sincere interest in the things discussed. The hushed attention which the men paid to Dean Miller's words of welcome was an inspiration to those of us interested in helping further pest control work. The variety of questions raised and the readiness with which the members entered into the discussions showed their interest in getting and in giving information which speaks well for the future of the pest control work in Missouri."

The greatest pleasures of our profession, and the most satisfying joys, are found in the knowledge of worth-



Group who attended the First G.O.P. Conference held at the University of Missouri, Columbia, Mo., March 19, 1940.

while accomplishment for the public. It is in these conferences that P.C.O.'s learn to sound the depths of their own ability, and that the boundaries of their vision are expanded, and it is here in these conferences that P.C.O.'s learn to weigh true values of P.C.O. service rendered to the public.

Those who participated in the program from the Department of Entomology were: Dr. Leonard Haseman, Head of Department; T. E. Birkett, Assistant Professor — resident teaching; Geo. D. Jones, Extension Assistant Professor; Philip C. Stone, Instructor — crop insect research; Lee Jenkins, Research Asst. in Entomology — fruit insect research; Harry E. Brown, Research Asst. in Entomology—fruit insect research; Wm. W. Smith, Research Asst. in Entomology—fruit insect research; Curtis Wingo, Research Asst. in Entomology — fruit insect research; Lloyd Adams, Graduate Assistant—resident teaching; J. LeRoy Armstrong, Graduate Assistant—resident teaching.

The following attended the conference:

A. L. Linck, Paramount Fumigating Co., Kansas City, Mo.; R. Holman, Paramount Fumigating Co., Kansas City, Mo.; H. T. Bromfield, Reliable Fumigators, St. Louis, Mo.; G. Vietor Davis, Huttis Sash & Door Co., St. Louis, Mo.; Thos. C. Raley, Getz Exterminators, Inc., St. Louis, Mo.; E. E. Burnett, Getz Exterminators, Inc., St. Louis, Mo.; C. I. Burnett, Getz Exterminators, Inc., Kansas City, Mo.; Wm. R. Dunham, St. Louis, Mo.; George Uttley, Getz Exterminators, Inc., St. Louis, Mo.; Jack P. Chatten, Heat Control & Insulating Supply Co., Columbia, Mo.; C. H. Bowen, The Chec Co., St. Louis, Mo.; Roy McCullough, Modern Fumigating Co., St. Louis, Mo.; U. O. Hawks, Inter-State Exterminator Co., Springfield, Mo.; H. H. Cassilly, City Fumigating Co., St. Louis, Mo.; James C. Walker, Acme Termite Control Co., St. Louis, Mo.; Charles Denny, Charles Denny & Co., St. Louis, Mo.; Reynold Schuyler, Termite Exterminating Co., Kansas City, Kansas; Tom Wilkinson, Getz Exterminators, Inc., Kansas City, Mo.; W. F. Exner, Termite Control Co., Webster Groves, Mo.; C. A. Maley, Maley Bros., St. Louis, Mo.; N. R. Pulley, George W. Rockwell Exterminating Co., Kansas City, Mo.; Frank D. Gates, Frank D. Gates Exterminating Co., Kansas City, Mo.; E. D. Wilbur, Heimbrock Exterminators, Kansas City, Mo.; D. H. Bedingfield, Getz Exterminators, Inc., Oklahoma City, Okla.; H. E. Whitmire, Whitmire Research Corp., St. Louis, Mo.; C. C. Wench, Continental Sanitary & Exterminator Co., Springfield, Mo.; J. T. Gargis, Continental Sanitary & Exterminator Co., Springfield, Mo.; P. H. Burnett, Getz Exterminators, Inc., Kansas City, Mo.; John G. Frederikson, St. Louis, Mo.; Al Cossetta, Pests, Kansas City, Mo.

Our thanks go out to Dean Miller, Dr. Haseman, Prof. Birkett, and the other members of the Dept. of Entomology for the splendid program given, and for their untiring efforts in helping us with the problems of our industry.

North Central States Entomological Conference

THE North Central States Entomologists Conference is now history, another successful meeting having been held March 21-22 at Purdue University, Lafayette, Ind. The closer relationship which is being noticed between P.C.O.'s and entomologists was reflected in the program with both Entomologists and P.C.O.'s taking a prominent part. The two day conference was a distinct benefit to both groups and the large attendance reflects the appreciation of the advantages by many in both industries.

We are listing below some of the subjects with speakers which were of special interest to members of the P.C.O. industry.

W. S. McCloud, Chairman
Friday Morning

The American Association of Economic Entomologists and Its Relation to Commercial Entomologists—Harry S. Smith, President A.A.E.E.

Correlating the Activities of the Entomologist and the Pest Control Operator—The Field of Pest Control for the College Trained Entomologist—Walter S. McCloud, President N.P.C.O.

Needed Research for the Pest Control Industry—Past, Present, and Future—Wm. O. Buettner.

Industrial and Household Fumigation Problems—Max Rukin.

Case Histories of Fumigations — J. L. Horsfall.

The Clothes Moth and Carpet Beetle Problems as Viewed by the Commercial P.C.O.—H. E. Jennings and Arthur Srebren.

The Brown-Banded Roach:

(a) Life History and Habits—G. E. Gould.

(b) Methods of Control—R. W. Fay.

Termites:

(a) How Long Can Soil Treatments Remain Effective—Geo. L. Hockenyos, W. E. McCauley.

(b) Ethics in Termite Control — H. S. Steckel.

The Use of Movies in Commercial Pest Control—Henry Turrie.

Household and Structural Pest Research —Each state representative will be asked to report.

Business Session.

The following participated in the program: J. D. Houser, A. A. Dean, L. Haseman, C. L. Fluke, Harry F. Dietz, R. H. Parks, Geo. Decker, C. B. Dibble, W. P. Flint, E. M. Searls, R. Hutson, F. L. Campbell, F. N. Wallace, N. F. Howard, L. F. Shropshire, G. E. Gould, C. E. Palm, Max Rukin, C. C. Compton, P. R. Neiswander, A. E. Lundquist, P. N. Armand, H. H. Walkden, M. D. Farrar, Lee Patrick, R. T. Cotton, C. W. Kearns, R. D. MacDoniel, A. M. Brunson, W. A. Huelsen, R. M. Caldwell, R. A. Blanchard, R. O. Snelling, L. L. Huber, G. A. Ficht, R. H. Painter, E. T. Jones, W. B. Cartwright, D. M. DeLong, G. E. Marchall, Geo. Still, S. C. Chandler, F. Sherman III, C. Wingo, L. F. Steiner, Lee Jenkins, C. L. Burkholder, D. A. Richter, C. R. Cutright, M. McCown, C. J. Drake, J. H. Bigger, P. Luginbill, G. D. Jones, G. C. Decker, C. M. Packard, A. M. Vance, W. A. Baker, F. G. King, J. H. Hilton, C. H. Richardson, R. C. Rendtorff, J. J. Dorris, W. E. McCauley, C. R. Donahan, W. A. Riley, G. Butcher, J. J. Davis.

Brazilian Ants

Charming Mrs. Arthur Krock, wife of the New York Times correspondent and herself a writer under the name "Martha Blair," has been having trouble with Brazilian ants.

Despite every conceivable effort to get rid of them, the ants have continued to infest her house. Finally, Mrs. Krock discovered that they came from a near-by bakery, and she asked the baker to close his shop long enough to fumigate.

The baker, however, demurred that his customers depended upon his daily output of bread, and if he closed down for two or three days, he would lose business.

So Mrs. Krock discussed her entomological predicament with her friend Evie Robert, wife of the secretary of the Democratic National Committee, who in turn called up her friend, George Allen, commissioner of the District of Columbia.

"George," said Evie, "can't you get the health authorities to fumigate the bakery? Martha just has to get rid of those Brazilian ants. They're driving her out of house and home."

"Brazilian ants?" replied Commissioner Allen. "Well, ordinarily, we'd be glad to drive out Martha's Brazilian ants. But these days we have to be awfully careful about the good neighbor policy."

Rats Outnumber Humans in U. S. Two to One

Washington. — The American Chemical Society reported today that rats outnumber the human population in the United States almost two to one.

The estimate was made in a report of the society on the development of insecticides. It said each rat does at least $2 damage a year—a total of 500 million dollars.

That would place the number of rats at about 250 million, whereas the population at the last census was about 131 million.

Protection of Fabrics and Furs From Clothes Moths and Carpet Beetles

By W. M. HOSKINS and MARIAN J. VAN ESS, *Division of Entomology, University of California.*

EDITORS' NOTES: *This address was given at the Third Annual Pacific Coast Pest Control Operators' Conference at the University of California, Berkeley, February 1940.*

EVERYONE, who is in the least observant, is aware that the surface of the earth is teeming with multitudes of insects and that the various species show more or less decided choice in the locations and conditions in which they live. Similarly, almost every kind of organic matter serves as a foodstuff for one or more kinds of insects, but astonishingly restricted feeding habits often occur. Many common names such as fleshfly, dung beetle, bean weevil, apple aphis, boxelder bug, chicken louse and numerous others have arisen because of food preferences shown by these various insects. As further illustrations of specific feeding habits the clothes moths and carpet beetles may be cited. The common and scientific names of the economically important species are as follows: webbing clothes moth, *Tineola bisselliella* Hum.; casemaking clothes moth, *Tinea pellionella* L.; tapestry clothes moth, *Trichophaga tapetzella* L.; black carpet beetle, *Attagenus piceus* Oliv.; buffalo carpet beetle (sometimes called the buffalo moth) *Anthrenus scrophulariae* L.; varied carpet beetle, *A. verbasci* L.; furniture carpet beetle, *A. vorax* Waterh.; varicolored carpet beetle, *Trogoderma versicolor* Creutz. The relative importance as economic pests varies in different parts of the world and in various sections of the United States. These insects are members of two widely different i.e., Lepidoptera and Coleoptera, but they possess in common the ability to utilize wool, hair, fur, feathers and hides as foodstuffs. These substances largely consist of complex proteins which are not affected by the digestive juices of animals or of most insects. In the testtube they are also extremely resistant to all but the most drastic chemical treatment.

While the general name "keratin" is used in referring to the protein in any of these substances, this is not a chemical individual for the keratins from nails, wool, hair, etc., differ somewhat in composition. Among humans there are differences in the composition of the keratin in the hair of different races. Chemical and X-ray examination of keratin (2) shows that it consists of long chains of amino acids united in the ordinary way but the chains are interlocked with one another through the amino acid cystine which contains sulfur. The formula of cystine is:

$$HOOC\text{-}CH(NH_2)\text{-}CH_2\text{-}S\text{-}S\text{-}CH_2\text{-}CH(NH_2)\text{-}COOH$$

In the presence of reducing substances, i.e., compounds which readily give up hydrogen, one molecule of cystine is split into two molecules of cysteine.

$$HS\text{-}CH_2\text{-}CH(NH_2)\text{-}COOH$$

This same disruption is brought about by potassium sulfide and certain organic acids which are able to bring keratin into solution. The resulting product can then be acted upon by the ordinary protein-digesting enzymes of animals and insects. Thus the digestion of wool and other such substances is possible only if a proper reducing agent is present in addition to the ordinary proteases in the digestive tract of the consuming organism.

With these ideas in mind a careful investigation was made (14, 31) of the webbing clothes moth, *Tineola biselliella*, and it was shown that such a reducing agent is present, but its chemical identity was not ascertained. The possibility that the clothes moth is able to digest keratin by the aid of some peculiar bacterial or fungus symbiont was ruled out by the researches of Titschak (40) who showed that larvae reared from sterilized eggs and free from any recognizable micro-organisms could live upon keratin equally as well as ordinary larvae. Thus, at least in the case of this insect, all the tribulations which it has caused mankind since prehistoric times are due to a peculiar condition of its digestive system. It would seem logical that a method of control might be based upon the idea of feeding an oxidizing agent and thereby preventing the first step in the breakdown of keratin. This was suggested by McTavish (33) who suggested that the mothproofing effect of certain derivatives of thiourea may be due to this reaction. Although the insects have not been investigated from this viewpoint, it is probable that the same digestive mechanism is present in the other clothes moths, the carpet beetles and also in the Mallophaga which feed upon hair and skin scales.

It should be noted that various kinds of furs are not attacked with uniform avidity by moth larvae. None, however, seems to be immune (30). Among a dozen kinds tested, rabbit, calf, goat and wild cat were attacked slightly whereas skunk, marmot and opossum were severely damaged. The larvae consume most furs by eating the hide near the base of the hairs, causing the latter to fall out, but with fox fur the hairs are avoided and hence the injury is much less apparent. Preference among furs seems to be related to nutritional requirements, for rabbit and calf fur, which are eaten with reluctance, do not permit the larvae to complete their development. A somewhat similar situation exists under conditions of starvation in which materials entirely unsuited for food will be severely damaged, *e. g.*, a European species of carpet beetle, *Anthrenus fasciatus* Herbst, prefers horn but may attack cotton, silk, artificial silk, filter paper or sponge (25). To a lesser extent this same situation prevails with all the clothes moth and carpet beetle larvae.

Despite the fact that woolen goods are so frequently infested, they are not an optimum food for clothes moth larvae. It was found by Colman (10) that addition of a small amount of dried yeast greatly promotes their growth. The almost unique ability of these larvae to digest keratin does not imply that this substance is necessary, for they often infest casein (3) and they thrive upon fish meal (23). Purified wool is particularly deficient for larvae of the casebearing clothes moth, *Tinea pellionella*, and this insect can complete its de-

velopment on that foodstuff only if yeast is added (7).

In a careful study of the nutritional needs of *T. bisselliella*, Crowell and McCay (12) found a synthetic diet of purified casein, purified lactalbumin and an extract of dried yeast to be an excellent food. Neither fat nor fat-soluble vitamins are needed but undoubtedly the chief function of the yeast extract is to supply some part of the complex aggregate of essential factors known as vitamin B. It is very probable that the well-known tendency of moth larvae to seek out soiled portions of woolen fabrics is due to their need for vitamin B and not to any need for fats. An interesting sidelight of this work is the suggestion that human sweat contains considerable vitamin B. The importance of studies such as that just discussed in relation to practical control of the insect lies in the fact that chemicals cannot be tested nor compared quantitatively unless the experimental animals are on a basic diet which is reasonably satisfactory for their normal development.

In attempting to evaluate the various means for protecting susceptible materials from the ravages of moths and beetles it is convenient to distinguish three principal methods. The first aims to destroy the various stages of the insects regardless of whether they are feeding or not. For this purpose fumigants and contact poisons are suitable. The second method depends upon incorporating a stomach poison, or possibly a contact poison, with the food so that death will occur before serious damage has been done. The third method aims to repel the adult so that eggs cannot be laid or to make the food so distasteful that larvae will starve rather than eat it. For this purpose the substance used need not necessarily be toxic in the ordinary sense. These three means for combating the pests will be briefly considered in turn. Unfortunately, investigators have often used different methods in testing the various materials and hence comparison of their results cannot be made in a quantitative way. There is need for standardization of methods for testing moth and beetle toxicants and repellents, *e. g.*, as has been established more or less satisfactorily in the case of fly sprays.

All the ordinary fumigants at one time or another have been recommended for killing clothes moth and carpet beetles. Precise data on the concentration and exposure required to exterminate the insects under prescribed conditions are of little practical value for control often must be secured in the presence of much absorptive material and in boxes, closets or rooms in which circulation is poor. Temperature also is an important variable. The beetles are more resistant than the moths and since infestations often occur together it is not safe to use the minimum treatment satisfactory for the latter. A useful comparison of recommended amounts of several fumigants has been given by Back and Cotton (4). At ordinary indoor temperatures with an exposure of twelve to twenty-four hours the amounts needed per 1000 cubic feet in a fairly tight fumigating chamber are: hydrogen cyanide (HCN), ½ pound; chloropicrin (CCl_3NO_2), 1 pound; ethylene oxide (C_2H_4O), 2 pounds; carbon disulfide (CS_2), 5 pounds; carbon tetrachloride (CCl_4), 30 pounds; a mixture of three volumes dichlorethane ($C_2H_4Cl_2$) and one volume carbon tetrachloride, 14 pounds; a commercial mixture of methyl bromide (CH_3Br) and carbon dioxide, 20 pounds. Data given by Colman (11) indicate that tetrahydronaphthalene ($C_{10}H_{12}$), sometimes called tetralin, is about twice as toxic

SOLVAY
TRADE MARK REG. U. S. PAT. OFF.

PARA-DICHLOROBENZENE
. . . for MOTHS

ORTHO-DICHLOROBENZENE
. . . for TERMITES

● **Available for quick spot shipments from over 100 stock points!**

In the rush season, delays hamper operations and cost you money! Solvay distribution service on Para-dichlorobenzene and Ortho-dichlorobenzene is available from over 100 stock points and branch offices . . . making sure that your orders are promptly filled and sent to you *without delay*. Write or telephone to the nearest branch office listed below or to

SOLVAY SALES CORPORATION

Alkalies and Chemical Products Manufactured by The Solvay Process Company

40 Rector Street New York

Branch Sales Offices:

BOSTON CHARLOTTE CHICAGO CINCINNATI
CLEVELAND DETROIT NEW ORLEANS NEW YORK
PHILADELPHIA PITTSBURGH ST. LOUIS SYRACUSE

HOPKINS'
REDRATSQUIL
(TRADE-MARK REG.)
POWDER or LIQUID

Made from the genuine Red Squill bulbs—the world's most potent non-poisonous Raticide. Oven dried under a temperature of 176 F.—biologically tested to assure maximum killing power. Relatively harmless to human beings, domestic animals and pets. Exterminators who use HOPKINS' REDRATSQUIL find that rodents take it readily—and fatally. Retains its killing power indefinitely. Write for information and prices on HOPKINS' REDRATSQUIL—in Liquid or Powder form.

HOPKINS' CROW BRAND
PYRETHRUM POWDER
and CONCENTRATED EXTRACTS

Full-strength, 100% quality Pyrethrum Flowers are used by Hopkins to produce high-kill insecticides. Our Pyrethrum Powders are milled to any degree of fineness you may require. HOPKINS' CONCENTRATED EXTRACTS give you the same extraordinary killing power in liquid form.

J. L. HOPKINS & CO.

IMPORTERS • MILLERS • MANUFACTURERS

220 Broadway ● New York

against *Tineola biselliella* as is the mixture of dichloroethane and carbon tetrachloride. Determinations of the median lethal dose (*i. e.*, the concentration required to kill 50 percent) in a 5 hour exposure period have shown methyl bromide to be a very promising fumigant against the black carpet beetle, for its toxicity is high and it is absorbed much less than most fumigants (16, 36).

All the substances mentioned above are liquids or gases which ordinarily can be used conveniently for only short periods. Certain solids which can be put among the goods to be protected and left indefinitely are widely used. Herrick and Griswold (23) found 2-3 ounces of naphthalene flakes or 8 ounces of mothballs in a tight container of five cubic feet capacity killed all eggs and larvae of the webbing clothes moth but 5 ounces of naphthalene flakes killed only four out of fifteen larvae of the varied carpet beetle in an exposure of fourteen days. Working with *Tineola biselliella* at 20-22°C and dosage of 15 ounces per 100 cubic feet Frey (18) obtained the following mortalities:

Naphthalene: 40% of larvae in 15 days; 100% of adults in 5 days; 99.6% of eggs in 4 days.

Paradichlorobenzene: 100% of larvae in 4 days; 100% of adults in 1 day; 100% of eggs in 4 days.

Hexachloroethane: 0% of larvae in 15 days; 100% of adults in 1 day; 37.9% of eggs in 4 days, and 100% of eggs in 8 days.

The low resistance of the adult stage is strikingly shown by these data.

Contact sprays have a limited but real place in the control of clothes moth and carpet beetles. Ordinary fly spray is highly toxic to any stage of these insects with which it makes contact. The commercial material Lethane, which is an organic thiocyanate, has been highly recommended by Johnson and Vallee (28), for not only is it highly toxic at once but its effect may persist for several months.

Among the stomach poisons, soluble arsenic compounds were the first to be widely employed. Their use has fallen into disrepute, however, largely because of objections from medical men and public health authorities, for the danger of absorption of arsenic through the skin of the wearer is very real, especially in hot weather. Recently, Back (5) has found that a number of commercial arsenical preparations failed to protect treated cloth from the furniture carpet beetle. Sprankle and Slabaugh (37) found arsenite to be so completely removed from flannel and heavy wool coating material by three gentle washings that no protection was afforded against clothes moth larvae. Arsenic may be dismissed as a practical agent for protecting goods from clothes moths and carpet beetles.

At the present time, compounds containing fluorine are probably the most popular protective materials for use in the home, hotel or office, especially for goods which are not cleaned often such as drapes, carpets, couch coverings, etc. When used with care sodium fluosilicate offers practically no hazard to humans or animals and it is sufficiently toxic to the pests concerned. It adheres well under ordinary usage and is but little affected by dry cleaning. While a single washing does not make the treated fabric liable to damage (32), three washings remove the protection (37). As the result of his work, Musser (35) strongly recommended that the ordinary householder use a saturated solution of sodium fluosilicate for all ordinary mothproofing requirements. The objection to this material is its limited solubility, 0.75% at 25°C (9), which requires that the goods be soaked or very liberally sprayed in order to get enough of the fluoride into the fabric. To overcome this difficulty complex inorganic fluorides of high solubility have been patented recently (38). A logical step beyond this is the use of organic fluorides, *e. g.*, triethanolamine silicofluoride (15) and aluminum fluoformate (29). The latter author has strongly recommended the use of acetates of the rare earths such as cerium and lanthanum which also impart a resistance to mildew and mold. They must be fixed in the fabric by heating.

Among strictly organic compounds, rotenone has received considerable recommendation for protection of goods from moths. However, its effect is not lasting and it is readily removed by dry cleaning (37). The volatile oils from cedar and naphthalene in the form of mothballs have long been the traditional agents for repelling adult female moths and thereby preventing them from laying eggs on or near any susceptible material. Since the rise in general popularity of paradichlorobenzene (PDB) it too has often been used for the same purpose. However, skeptics have questioned the value of these materials and quantitative tests have generally agreed that altogether too much confidence has been generally placed in them (6, 1). However, in confined spaces the vapors of naphthalene and of PDB are amply able to kill eggs, larvae and adults of the various clothes moths, but considerable damage may result before the larvae expire. A recent report on *d*-naphthyl isothiocyanate (39) and *n*-butylcarbitol thiocyanate (Lethane) shows that both of these compounds are highly toxic. Though they differ but slightly in their toxicity, *d*-naphthyl-isothiocyanate is a bit more repellent and more rapid in its effect on clothes moth larvae and *n*-butylcarbitol thiocyanate is slightly more rapid against carpet beetle larvae. A concentration of one percent (by weight of cloth) of either compound results in 100% mortality of carpet

Group Attending the Third Annual Pacific Coast Pest Control Operators' Conference at Berkeley, California, February 22-24, 1940.

beetle larvae, but only one-half to one-third of this concentration is required for clothes moth larvae. Both compounds are volatile, hence they are not permanent mothproofing agents. They are not significantly toxic to warm blooded animals.

In considering substances which are so distasteful to larvae of moths or beetles that they will starve rather than eat treated goods first mention must be made of the group known as the Eulans. The history of these patented substances of secret composition goes back to the observation during some experiments in the laboratories of the I. G. Farbenindustrie in Germany that a certain green cloth was not attacked by moth larvae. After considerable searching it was learned that a yellow dye called Martius yellow was responsible for the repellent effect. This dye was used in combination with a green dye merely to lighten the shade. The question of attempting the development of a whole line of dyes which would also repel moths was considered and rejected and it was decided to try to synthesize a colorless repellent which would not interfere with the use of the regular dyes. The result was the first Eulan which was brought out in 1921. Since then numerous other Eulans have appeared. The development and testing of these compounds is given in detail by Hase (24). The claim is made that goods are rendered permanently safe from both moth and beetle larvae. These materials are primarily suitable for application at the time of weaving and hence have been of no use to the householder. However, the latest of the series is now being offered for home use (34).

There are numerous proprietary products which contain substances known as cinchona alkaloids. These are by-products from the manufacture of quinine. In the form of esters with fatty acids such as oleic acid they are soluble in cleaners solvents and may be applied in such solutions. They then resist ordinary washings but gradually become inactivated and of course are removed by dry cleaning (37).

An organic compound which appears to be both repellent and toxic has given very encouraging results against larvae of the difficultly controlled furniture carpet beetle, *Anthrenus vorax*, according to the experiments of Back (5). This material has the formidable name pentachlorodioxytriphenylmethane-sulfonic acid. It resists washing, dry cleaning and exposure. In all probability many other substances which are ordinarily thought of primarily as stomach poisons, actually owe much of their effectiveness to their repellent effects. As examples, may be cited arsenicals and fluorides which strongly suppress feeding by leaf-eating caterpillars, by ants, etc., unless used at low concentrations.

In conclusion, attention may be called to a few types of mothproofing substances which are well represented in recent patent literature. It has become customary for many chemical manufacturing concerns to test every product as a possible insecticide and to patent all those which show the remotest promise. Hence, a single patent claim cannot be trusted, but when numerous members of related groups are patented by rival concerns there is a strong possibility that something of real merit is close at hand. Four types of organic compounds may be mentioned from the recent patents on mothproofing preparations.

1) Substitute phenols. A long aliphatic chain is added to a phenol either directly or through a carbonyl group to form a ketone, or through oxygen, nitrogen or sulfur to form ethers, esters, amines, amides or sul-

PEST CONTROL CHEMICALS COMPANY

MODERN CHEMICALS FOR PEST CONTROL

BIRD REPELLENT
A NEW SERVICE YOU CAN OFFER
Keeps buildings free from pigeons, starlings, and other roosting birds.

THALLIUM SULPHATE RAT PASTE
Gives results on your most stubborn rat jobs at a minimum of cost to you.

To completely fill your needs, we also offer for your approval:
PHOSPHORUS PASTE
THALLIUM SULPHATE ANT PASTE
THALLIUM SULPHATE IMPREGNATED CANARY SEED

Freight Prepaid on Shipments of Phosphorus Paste and Thallium Treated Seed

PEST CONTROL CHEMICALS CO.
P. O. Box 37 *Write for Details* BUFFALO, N. Y.

Mr. Jobber:
HERE IS YOUR COMPLETE LINE OF
COLE-SPEED
MOTH PREVENTATIVES
SPRAYS
CRYSTALS
BLOCKETTES
For Immediate Delivery

WRITE FOR COMPLETE CATALOGUE AND PRICES

For the trade only; in bulk or small packages under private brand.

COLE CHEMICAL CORP.
Long Island City New York

fides (13). The phenols are frequently chlorinated as well. The derivatives having a long alkyl sidechain and the corresponding ketones appear to be the most important.

2) Quaternary ammonium compounds. A variety of compounds containing trivalent nitrogen may be converted to quaternary ammonium salts by reaction with dimethyl sulfate. Dodecylaniline, *p*-dimethylaminostrearophenone, heterocyclic nitrogen compounds, amides of amino acids and amino di- and triarylmethanes have been suggested as suitable starting materials (19, 27). These derivatives may also be devised in such a way as to include other groups which enhance the activity of the compounds as in quaternary ammonium fluosilicates (17) and the quaternary derivatives prepared from aminoaryl sulfones (20). The compounds may be applied during finishing processes, dry cleaning, etc.

3) Thioacetals. This new type of mothproofing compound has been extensively patented. They are prepared by the condensation of an aromatic aldehyde or ketone with two molecular quantities of an aromatic or aliphatic mercaptan, *e. g.*, benzaldehyde, acetophenone, or isatin with *p*-chlorothiophenol or *p*-chlorobenzyl mercaptan (21, 8).

4) Heterocyclic compounds. Considering the recent interest in phenothiazine $C_6H_4\begin{smallmatrix}-S-\\-N-\\H\end{smallmatrix}C_6H_4$ (sometimes called thiodiphenyl amine) as an insecticide, it is not surprising that a number of related heterocyclic compounds have been patented (22). Diphenylene oxide, phenoxthin, diphenylene dioxide and thianthrene and some of their derivatives are included. Phenoxthin, diphenylene dioxide and thianthrene differ from phenothiazine in having, respectively, one oxygen and one sulfur, two oxygen, and two sulfur atoms incorporated in the ring structure in the same position as the nitrogen and sulfur atoms of phenothiazine. It is stated that the introduction of alkyl and halogen substituents increases the effectiveness of the compounds.

LITERATURE CITED

1. Abbott, W. S. and S. C. Billings. Jour. Econ. Ent. **28**, 493-5 (1935).
2. Astbury, W. T. Kolloid Zeitschrift. **69**, 340-51, (1934).
3. Back, E. A. and R. T. Cotton. U.S.D.A. Farmers' Bulletin No. 1655, 33 pp., (1931).
4. Back, E. A. and R. T. Cotton. U.S.D.A. Circular No. 369, 59 pp. (1935); rev. (1937).
5. Back, E. A. Proc. Ent. Soc. Washington **39**, 269-72, (1937).
6. Billings, S. C. Jour. Econ. Ent. **27**, 401-5, (1934).
7. Billings, S. C. Jour. Econ. Ent. **31**, 616-17, (1938).
8. Bindler, Jakob (to J. R. Geigy A.-G.). U.S. Pat. 2,070,350-3 (1937).
9. Carter, R. H. Jour. Ind. Eng. Chem. **22**, 886-7, (1930).
10. Colman, W. Jour. Econ. Ent. **25**, 1242, (1932).
11. Colman, W. Jour. Econ. Ent. **29**, 629-30, (1936).
12. Crowell, Mary F. and C. M. McCay. Physiol. Zool. **10**, 368-72, (1937).
13. Deutsche Hydrierwerke. British Pat. 474,600 (1937), 495,639 (1938), 495,761 (1938), 497,214 (1938); French Pat. 802,508 (1936).
14. Duspiva, F. Comptes Rend. Laboratoire Carlsberg. Serie chimique **21**, 177-201, (1936).
15. Engals, W. H. and J. Weijland. U.S. Pat. 2,176,894 (1937).
16. Fisk, F. W. and H. H. Shepard. Jour. Econ. Ent. **31**, 79-84, (1938).
17. Flint, Robert B. (to E. I. duPont de Nemours and Co.) U.S. Pat. 2,150,601 (1939).
18. Frey, W. Arb. physiol. angew. Ent. **6**, 189-98, (1939).
19. Geigy, J. R., A.-G. British Pat. 476,843 (1937); Swiss Pat. 200,699, (1939), 202,160-2 (1939).
20. Geigy, J. R., A.-G. Swiss Pat. 200,667 (1939), 203,590-2 (1939).
21. Geigy, J. R., A.-G. Swiss Pat. 162,058 (1938), 165,030-2 (1934), 193,611 (1938), 194,375 (1938), 196,-140-52 (1938), 203,301-5 (1939); German Pat. 641,625 (1937); British Pat. 491,182 (1938), 492,938 (1938); French Pat. 829, 834 (1938).
22. Geigy, J. R., A.-G. British Pat. 467,701 (1937), 502,320 (1939); French Pat. 821,370 (1937); Swiss Pat. 203,306 (1939).

Martin, Henry and Rudolf Hirt (to J. R. Geigy A.-G.) U.S. Pat. 2,123,572 (1938); German Pat. 665,218 (1938).

23. Griswold, Grace H. Jour. Econ. Ent. **26**, 700-2 (1933).
24. Hase, A. Anzeiger fur Schadlingskunde **8**, 73-82, (1932), **9**, 35-9, 85-92 (1933), **10**, 123-34, (1934); Melliand Textilberichte **18**, 901-5, 985-90, (1937).
25. Herfs, A. Vth Congres Internationale d'Entomologie II, 295-302, (1933).
26. Herrick, G. W. and Grace H. Griswold. Jour. Econ. Ent. **26**, 446-51, (1933).
27. I. G. Farbenindustrie A.-G. British Pat. 483,-368 (1938); French Pat. 826,142 (1938).
28. Johnson, F. S. and A. G. Vallee. U.S. Naval Med. Bul. **35**, No. 3, 7 pp. (1937).
29. Jones, H. I. Exterminators' Log **6**, No. 2, 12-13, (1938).
30. Kemper, H. Anzeiger fur Schadlingskunde **12**, 1-6, (1936).
31. Linderstrom-Lang, K. and F. Duspiva. Compt. Rend. Laboratoire Carlsberg, Serie chimique **21**, 53-82, (1936).
32. Marcovitch, S. Jour. Econ. Ent. **28**, 495-6, (1935).
33. McTavish, W. C. Soap, **14**, No. 1, 103-5, 123, (1938).
34. Miller, L. M. The Family Circle, pp. 14-15, Sept. 1, (1939).
35. Musser, D. R. Jour. Kansas Ent. Soc. **9**, 116-25, (1936).
36. Shepard, H. H. and A. W. Buzicky. Jour. Econ. Ent. **32**, 854-9, (1939).
37. Sprankle, C. N. and Ruth Slabough. Textile World **87**, 2015, (1937).
38. Stotter, H. and T. Herman, U. S. Pat. 2,130,-435 (1938).
39. Tischler, Nathaniel and A. Viehoever. Soap **14**, No. 2, 109-11, 113, 115, 117, 119, 121, 123 (1938).
40. Titschak, E. Zool. Anzeiger **93**, 4-6, (1931).

In prosperity be moderate; in adversity prudent. Pleasure is fleeting; honor is immortal. Prudence can accomplish all things. Sinful motive is as wrong as the act. Perform whatever you have promised.

—Periander.

Toxicity of Phosphorus to Cockroaches

By **F. L. CAMPBELL**, *Associate Professor of Entomology, College of Agriculture, The Ohio State University, Columbus, Ohio.*

EDITOR'S NOTE: *These remarks were made by Prof. F. L. Campbell at the Seventh Annual Convention of the National Pest Control Association last October.*

FOR a study of the toxicology of phosphorus against nymphs of the American and German cockroaches, a commercial, 2 per cent phosphorus paste was used as the source of phosphorus. In this product phosphorus is finely dispersed and suspended in a viscous medium.

By quantitative feeding of phosphorus paste diluted with syrup, the median lethal dose of phosphorus for the American cockroach was found to be 0.02 mg. per gm. showing that it is a highly toxic stomach poison for this species. Phosphorus was much more toxic to the American cockroach than was sodium arsenite or sodium fluoride when the latter were fed in the same viscous medium and phosphorus was imbibed more rapidly and with less regurgitation than were the other two poisons. Sodium arsenite was more toxic in water than in syrup, but even in water it was less toxic than phosphorus.

The German cockroach was less susceptible to phosphorus in paste diluted with syrup than was the American cockroach, the M.L.D. for the former being 0.13 mg. per gm. as compared with 0.02 mg. per gm. for the latter. The larger M.L.D. for the German cockroach cannot alone account for the failure of phosphorus paste to control this species in practice. It is likely that the German cockroach does not imbibe paste as freely as does the American cockroach.

Odorless Gas Kills Two Skunks

West Orange, N. J. — Two policemen, called recently to a house where two skunks had ensconced themselves in the cellar, cleared out the family, connected a garden hose to the police car exhaust pipe and let the hose dangle in the cellar window. Within a few minutes odorless carbon monoxide had killed the odorous pair.

A Doctor Looks at Pest Control

By ALEX. J. JONES, *M. D., Springfield, Illinois.*

THE average physician seldom has occasion to give thought to the pest control operations taking place in his city. It is true that insects and the related ticks as well as rats are of tremendous importance as vectors in the transmission of disease, but the vector aspects of this relationship are in the field of specialists. Most of we practicing physicians may treat cases of insect borne disease, but we seldom give thought to the insects themselves or to the men engaged in insect and other pest control.

During the past two years I have had occasion to be in close touch with a member of the pest control profession and have gained an interesting in-sight into the nature of such work. It seems to me that a well trained and concientious pest control operator has an interesting field of usefulness that should be at once deserving of the respect of his community. Neither insect nor rodent pests have any place in the modern community either from the health or the esthetic point of view. Unfortunately the chemicals used in the control of these pests may be as great a menace to the public as the pests themselves if handled by incompetent men. It would appear to be in the interest of the public welfare to require some form of state certification of the men doing this useful but dangerous work. Surely incompetence in the pest control operator is of greater danger to the public welfare that it would be, for example, in a mortician or veterinary both of whom are licensed by the State of Illinois.

When the operator renders other forms of sanitary service such as disinfection his services become of more obvious interest to the physician and the health authorities. In the field of disinfecting service the general public has no easy means of determining the quality of the work being done. It is easy to see whether insects or rodents are dead or alive but bacteria and fungi are observable only with a microscope. Business houses such as restaurants and hotels may have continuous service from a pest control or sanitary service company and thus be in a position after a short time to evaluate the operator's competence. The householder, however, seldom needs the services of these companies except at widespread intervals and without some form of certification the public is at the mercy of chance in obtaining competent service.

There is doubtless a field of activity in which the physician and a general sanitary service company is indicated. The confidence of the physician in the ability of the service company is the first step in promoting such cooperation. Where the physician does not have the personal acquaintance of a suitable service company he hesitates to extend cooperation in the absence of some form of certification of the operators.

CHISELER

Here is the latest—He is the salesman who while waiting in the outer office or reception room of a prospective client, cuts his own price twice.

Wake up PCO's and stop trying to sell 'price' and do not be hoodwinked into believing every story that you hear about your competitors and the prices they are allegedly submitting.

Lethane 384 Special

For General Pest Control Sprays

Many pest control operators know that sprays containing Lethane 384 Special kill not only adult insects, but their larvæ and eggs as well.

Because of their greater initial effectiveness, Lethane sprays will reduce the time and expense of re-treating premises.

Lethane 384 Special sprays leave no objectionable odor, and, therefore, are preferred by the home owner.

For satisfactory and economical pest control sprays use Lethane 384 Special.

RÖHM & HAAS COMPANY, INC.

222 West Washington Square, Philadelphia, Pa.

CHICAGO · KANSAS CITY, MO.

Canadian Agent—P. N. Soden & Co., Ltd., Montreal, P. Q., Canada

Properties of Soils Related to Termite Control

By G. L. HOCKENYOS

PART TWO

Continued from March Issue

Two properties of soils are particularly important in the behavior of water base soil poisons such as arsenates and arsenites. These are adsorption and base exchange. The soil colloids are responsible for both of these activities and so it is the soils such as clays with a high colloid content that will exhibit these properties to greatest extent. Adsorption has been mentioned in connection with organic poisons but it is also important in arsenicals. Soil colloids have on their surface a layer of replaceable bases called the helmholtz layer. These bases are held by electrostatic charge and are capable of chemical reaction or of replacement. In most soils calcium is the chief base, and magnesium potassium and sodium follow in that order. The law of mass action applies to base exchange in that, if a great excess of sodium salt is applied to a soil, it will replace all of the calcium. Or, vice versa, if a calcium salt is applied all of the sodium potassium, etc., will be driven out. There is an order of preference, however, called the Lyophylic series in which the bases are listed in the order of their ease or difficulty of replacement. This series is hydrogen, calcium, magnesium, potassium, sodium and lithium. The hydrogen being the most difficult of all to replace, and lithium the easiest. Copper and lead are close to hydrogen, but their exact position is not known to the writer. Adsorption and base exchange are both responsible for a certain measure of fixation of arsenates. The adsorption results in the direct holding of the arenate ions by the colloid particles and the base exchange results in the formation of calcium arsenate which is much less soluble than sodium arsenate. The best approach to this problem is to consider the close analogy between the chemical behavior of arsenates and phosphates. If we may assume that arsenates will behave like phosphates in the soil then we have the accumulated knowledge of soil phosphate behavior to draw on as a guide in examining arsenate behavior.

In farming practice, phosphorus is usually added to the soil as the water soluble calcium acid phosphate and there has been much study of the fate of such phosphates with respect to leaching, diffusion and fixation. One has only to look at soil fertility test plots to see that lateral diffusion of phosphates is not very great in most soils. The line of demarcation between plots heavily fertilized with soluble phosphates and plots lacking in phosphates is very sharp in respect to plant growth.

One soil investigator, R. H. Bray, finds that small spots of soil may have a high concentration of soluble phosphate while only a very short distance away no detectable amount of phosphate will be found in the soil solution. Such a condition may exist for months. If diffusion were very rapid, such variations could not long exist.

In most soils, the fate of soluble phosphates is that they are promptly adsorbed by the soil and the degree of adsorption is a function of each soil type and is partly due to the replaceable soil bases, partly to replaceable anions and partly to the physical force of adsorption. Organic colloids as well as soil colloids play a part in this fixation. There are usually more soil colloids in the subsoil than in the surface soil. If there is a large amount of organic matter in the surface soil, however, this may not be true.

The amount of phosphate that a given soil will fix is a function of the amount of soluble phosphate in the soil solution. Thus, if a small amount of soluble phosphate is placed in the soil, nearly all of it will be promptly fixed by the soil; but, if a large amount is added, a larger amount but a smaller per cent of the total will be fixed. If a soil is treated with a given amount of phosphate and then leached, the unfixed portion will be removed. Successive leaching thereafter will remove successively smaller amounts of the phosphate that were fixed and not removed by the first leaching.

Put in other words, the soil may be said to fix or "bank" a part of any amount of phosphate put into the soil solution. The smaller the amount put into the soil, the larger the proportion that will be banked or fixed; and, conversely, the larger the amount, up to certain limits, the larger the amount but the smaller the per cent of the total that will be banked. Then, if the phosphate is withdrawn by leaching, some of the banked phosphate will be returned to the soil solution. As the amount left in the bank diminishes, the amount returned to the soil solution will also diminish.

In a humid climate, with a soil of moderate moisture holding power, about 40 to 50% of the rainfal will percolate or leach through the soil. This water tends to remove soluble matter in the soil solution and carry it to lower depths and eventually to the underdrainage currents of the soil. On the other hand, there is much water movement toward the surface of the soil. During long periods there may not be enough rain to go very deeply into the soil and the soil solu tion may be moving upward to re place that evaporated from the surface. This movement results in a concentration of soluble phosphates on the surface of the soil.

The experimental work reported hereinafter was primarily to determine if we are justified in the assumption that arsenates will behave in the soil as the phosphates do.

Two methods of analysis were used: First a qualitative method based on a solution of silver nitrate and nitric acid; and, second, a colorimetric method based on the stannous chloride reduction of ammonium arsenomolybdate. This method is exactly that used by many soils workers in phosphate determinations. It was found to give good results, but the depth of color for a given amount of arsenic was one-fifth that for a like amount of phosphorus. The amount of phosphate in soil solution is so small in proportion to the amounts of arsenate used in termite work that

the color due to phosphates could be disregarded. The colorimetric method is very sensitive and the best reading range is from 1 to 5 ppm of arsenic in the solution.

The soil used was a yellow clay subsoil underlying a brown silt loam from Sangamon County, Illinois. It had the advantage of uniformity, high adsorption capacity and ease of handling in laboratory operations. After some experimentation it was found that a ratio of 30 gms. air dried soil to 20 ml of solution gave a slurry that was readily filtered on a Buchner funnel. Crystalline disodium acid arsenate containing 7 molecules of water of crystallization was used. The degree of fixation is given in the following table.

It is a common practice for termite control operators to puddle the soil along a foundation as the soil is backfilled. The soil water slurry used in the above experiment was a more fluid one than would be likely to occur in practice and the soil was thoroughly air dried at the start. It is probable that in practice an operator using a 5% solution would actually be adding to the soil an amount equal to about the 2.5% solution of this experiment. In other words, he would be applying about 1.5 lbs. of arsenate per 100 lbs. soil and of this amount about 1 lb. would be fixed and ½ lb. remain in the soil solution.

The sample treated with 5% arsenate was leached with the result indicated and was then stirred with another 20 ml. of water and again filtered. This time .125 gm. or 12.5% of the original amount of arsenate applied was recovered in the filtrate. A third leaching removed 7% of the original amount. Apparently an adsorption curve and a filtration recovery curve exists for arsenates as it does for phosphates.

In order to determine what effect drying, and even baking, would have on the recoverability of arsenate, samples were thoroughly air dried and some baked at 105° C. If analysed as soon as stirred with water, the amount of arsenate recoverable was greatly reduced, but if allowed to stand in slurry form for some hours the amount recovered was the same as before drying. If the slurry was heated to the boiling point and then cooled before analysis the amount adsorbed was increased by 50%. It was necessary of course to replace the water lost by evaporation.

The addition of amounts of either sodium chloride, sodium carbonate or hydrochloric acid equal to the amount of sodium arsenate did not change the amount of arsenate adsorbed. The addition of lime (calcium hydroxide) to the soil increased the degree of adsorption, as would be expected. The

No. 1. Amount of sodium acid arsenate retained by 30 gm. subsoil when mixed with 20 ml. of solutions of various concentrations.

Gms. Arsenate In Solution	Per Cent Arsenate In Solution	Gms. Adsorbed	Per Cent Adsorbed
1.0	5.0	.4	40
.5	2.5	.325	65
.25	1.25	.21	85
.125	.625	.109	84
.0685	.312	.0605	97

ESPECIALLY DESIGNED TO GIVE YOU
Complete Respiratory Protection
AGAINST HCN
(APPROVED BY THE U. S. BUREAU OF MINES)
WITH EASY, LIGHTWEIGHT WEARING COMFORT!

Available also with "GMC" Canister for CHLORPICRIN protection.

THE M•S•A "GMK" HYDROCYANIC ACID GAS MASK WITH THE ALL-VISION FACEPIECE

Pest control with HCN is easier and *safe* when you utilize this specialized M.S.A. Mask —and protection is linked to all-day wearing comfort by many exclusive refinements of design and construction. The easy-fitting, molded rubber facepiece fits any face without binding or local pressure areas; provides maximum wide-angled vision through greatly-enlarged lenses of laminated glass; eliminates fogging; sharply reduces dead air space, and offers other superior features for *your* advantage. *Write today* for the details—they will interest you!

MINE SAFETY APPLIANCES COMPANY
Braddock, Thomas & Meade Sts., Pittsburgh, Pa.
District Representatives in Principal Cities

MADE TO ORDER
FOR
PEST CONTROL WORK

MODEL 36

½ H.P. G.E. MOTOR
TIME SWITCH OPERATES 1 TO 45 MINUTES AUTOMATIC SHUT OFF
ADJUSTABLE NOZZLE SPRAYS IN ANY POSITION
VOLUME CONTROL FINEST DIFFUSING WITH WARM AIR
COMPRESSOR TYPE
1 GALLON CONTAINER

Husky, ½ H.P. GE Motor; powerful rotary compressor; 1 gallon container; adjustable nozzle; 30 minute automatic time switch. Air volume control regulates density of spray. A ruggedly-built high-capacity sprayer for real commercial service.

Breuer's
TORNADO
ELECTRIC SPRAYERS

Fast, economical spraying, plus rugged, durable construction have made Breuer's TORNADO Electric Insecticide Sprayers the favorite of the Pest Control Industry. Exclusive features include air volume control for regulating spray; adjustable nozzles; perfect balance; and patented warming action which produces maximum kill from your insecticide.

Seven perfected models to choose from, ranging from 1 pint to 1 gallon capacity—both compressor and blower type. There's a genuine Breuer's TORNADO for *your* job.

Write for full details and our liberal discounts to Pest Control Operators.

BREUER ELECTRIC MFG. CO.
5130 N. Ravenswood Ave. Chicago, Ill.

addition of aluminum sulfate, copper sulfate, or ferric chloride also greatly increased the arsenate holding power of the soil. The effect of adding lime to the soil could be overcome by using sodium carbonate with the sodium arsenate solution. The addition of sulfuric acid overcomes the effect of added aluminum sulfate, and the addition of sodium carbonate increases the effect of added aluminum sulfate.

The question is frequently asked whether the addition of the alkali chromates or dichromates or of dinitrophenol increased the fixing power of the soil for arsenates. The chromates and dichromates are such powerful oxidizing agents that they interfere with the stannous chloride reduction method of analysis. Alpha dinitrophenol, however, does not interfere and the effect of adding an amount equal to 20% of the sodium arsenate was repeatedly examined. No effect on either the amount of arsenate held by the soil or the rate of recovery of that held could be found.

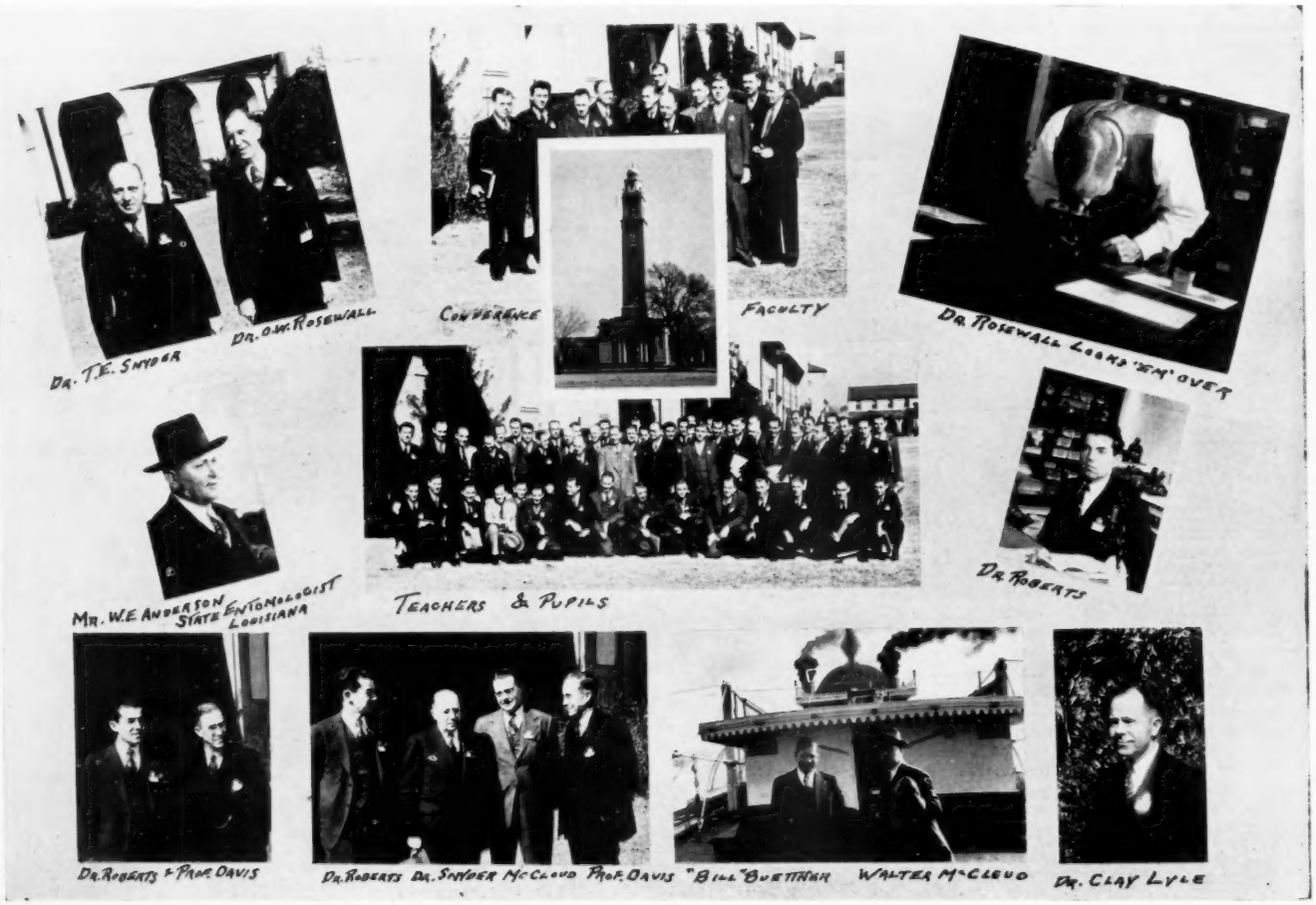
It was interesting to note that, when samples of soil were allowed to dry in beakers, there was a marked stratification of the arsenate in the soil. The surface fraction having five times and the bottom fraction only one-fifth the average of the entire sample.

There has recently been considerable interest in the use of arsenate of lead as a soil poison for termite control. It was found that when 3 gms. of lead arsenate was mixed with 27 gms. soil and 20 ml. water added the amount of arsenate in solution was one-half that when a like amount of arsenate of lead was stirred with a like amount of water. When, however, calcium arsenate was used, the soil seemed to increase the amount of soluble arsenate by 25%.

Some termite control operators make it a practice to soak sawdust in an arsenical solution to either feed the termites or to supply a fund of available arsenate to the soil. It was thought of interest to determine if 100 mesh and 200 mesh wood flour would take up a sodium arsenate solution without change of concentration. Accordingly, samples of 7.5 gm. each were soaked in 50 ml. 5% solution of sodium arsenate overnight and then filtered on a Buchner funnel and the filtrate analysed. There was very little difference in the arsenate concentration of the filtrate and the original solution. It was interesting to note that, in both samples, 28 ml. of solution were recovered.

A very important question is, of course, the amount of arsenate required to give effective termite control and the relative merits of fixed and dissolved arsenate in the soil. Unfortunately, this work was not started until November, and only a few termites were available for experimentation. The testing technique was essentially that published by the

Second Annual Southern Pest Control Operators' Conference, Louisiana State University, January 29, 30, 31, 1940.



The Conference as seen by Walter McCloud

writer in the April, 1939, issue of the Journal of Economic Entomology.

In the first test the chemicals used were ground into the soil in the dry state and water added, or rather the soil added to the water.

The results follow:

No. 2. Survival time of about 18 out of 20 applied termites to 40 gms. soil plus the indicated amount of poison and 20 ml. water. The poison being mixed with the soil in the dry state. The soil being a brown silt loam surface soil.

Chemical Applied	Amount Applied	Survival Time
Sodium Acid Arsenate	.1 gm. or .25% of soil	more than 8 days
Sodium Acid Arsenate	.2 gm. or .5 of soil	more than 3 days
Calcium Arsenate	1.0 gm. or 2.5 of soil	more than 5 days
*Calcium Arsenate	5.0 gm. or 12.5 of soil	more than 7 days

*Termites did not enter soil.

In a second experiment, the chemicals indicated were added to 60 ml. water and this was used to puddle 100 gm. of soil which was then dried and 40 gms. of the dried soil added to 20 ml. water after which 20 termites were applied to the soil. The results follow:

No. 3. Survival time of about 18 out of 20 termites applied to 40 gm. soil containing the indicated amount of poisons. The amount being that applied to 100 gms. soil. The soil being a brown silt loam surface soil.

Chemical Applied	Amount Applied	Survival Time
Sodium Acid Arsenate	1 gm. or 1%	3 days
Sodium Acid Arsenate Plus Copper Sulphate	1 gm. or 1% 2 gm. or 2%	5 days
Sodium Acid Arsenate Plus Aluminum Sulfate	1 gm. or 1% 3 gm. or 3%	6 days
Sodium Acid Arsenate Plus Lead Nitrate	1 gm. or 1% 1 gm. or 1%	4 days
Check No Chemicals		Lively at end of 8 days

These tests are not extensive enough to justify any conclusions, but indicate that the relatively insoluble forms of arsenate are not as quickly effective as the soluble sodium arsenate and that the minimum effective concentration of sodium arsenate in this particular soil is around ¼ to ½% or 1 lb. to from 200 to 400 lbs. soil.

Very little field work was done. One experiment was described in the November, 1939, issue of "Pests." It may be well to add that, in the test described therein, a duplicate was run in which 20% dinitrophenol was added to the sodium arsenate and that no difference in the extent of diffusion could be found.

Good results with lead arsenate as a termite soil poison have been reported from New Jersey where the tests were applied to a sandy loam, and poor results are reported from Illinois where the soil was a silt loam. Difference in adsorbing power and in relative amount of soil solution movement as well as rainfall are probably the factors accounting for this variation.

The fact that good termite work has been done with arsenicals for many years is proof enough that it

MAGIKIL
REG. U.S. PAT. OFF.
Easy TO USE
ANT BAIT JELLY
KILLS ANTS
SIMPLE! QUICK!
IN HANDY TUBES AND TRAPS
SIZES to fit YOUR NEEDS
1 oz. Garden Tubes
3 oz. Estate Tubes
8 oz. Jumbo Tubes
5 lb. Cans
30 lb. Pails
Safety Traps for household use
New! Improved! Sure!
Developed by one of the leading universities in the United States and further backed up by 5 years of steadily increasing sales.
We are also offering Thallium Sulphate 99.9% (made in U. S.) packed in 1-lb., 5-lb. and 10-lb. containers.
PRICES ON REQUEST
For Further Details and Literature, Write to
LETHELIN PRODUCTS CO., Inc.
WOODRIDGE, NEW JERSEY

EXTERMINATOR'S CHEMICALS

THALLIUM SULPHATE
(Not offered for sale in states where law forbids)

SODIUM FLUORIDE
Domestic or Imported

SODIUM ARSENATE
(Not offered for sale in states where law forbids)

RUMETAN ZINC PHOSPHIDE

Pfaltz & Bauer, Inc.
Empire State Bldg. New York

When Writing to Advertisers Mention "Pests"

can be done. The purpose of this work has not been to set up recommendations for improving practices, but rather to analyse the factors involved and to establish a sound basis for the planning of experimental work that will lead to improvement. Fortunately, the analysis of soil for soluble arsenic and total arsenic is easy and rapid once the technique has been mastered. Analysis of test plot soils from time to time should make it possible to determine the behavior of arsenical soil poisons. It may be objected that this work applies only to arsenates whereas arsenites are also much used. The analytical procedure used in this work is not directly applicable to arsenites; so, for the sake of simplicity, only arsenates were studied. In general, the arsenites should behave in the soil much like the arsenates but nearly all arsenites are more soluble and also more toxic than arsenates.

Destructive and Useful Insects By Metcalf and Flint

"Metcalf and Flint" is so well known and so much used by entomologists young and old that a mere announcement of the appearance of a second edition 11 years after the first should be sufficient to place it in the libraries of hundreds of entomologists. However, our enthusiasm for this book cannot be restrained. If a young economic entomologist could afford only one book he would get the most for his money in "Metcalf and Flint."

Every writer of a second edition of a textbook will point out that knowledge of his subject has greatly increased since his book was first written and that he has endeavored to bring it up to date. Professor Metcalf and Mr. Flint have had to deal with the whole field of entomology in which tremendous advances have occurred during the past ten years, particularly in insect control. In spite of the staggering task confronting them, they have not only succeeded in bringing the book up to date in factual information but have improved the book in other ways. Perhaps the most valuable additions to the book are the keys to the orders of adult and immature insects, the latter being an innovation in a general textbook of entomology. Many illustrations have been added and the subject index enlarged, covering 81 pages against 58 pages in the first edition. Although the book is only 63 pages longer than the first edition the authors estimate that it contains 20 per cent more material. This was accomplished by closer spacing of type, which is still easy to read. A definite scheme of arrangement is followed in the latter two-thirds of the book dealing with destructive insects and their control. Each species or group of related species is given a number that is used for cross reference in the text. Except for a few changes in wording, the chapter titles remain the same as in the first edition. "Forest insects" might have been included in the title of the chapter on insects attacking shade trees and shrubs, as those species that are of greatest concern in forests are not neglected.

Sampling, as usual, the subjects best known to us, we have nothing but praise for the competent handling of the sections on postembryonic development, chemical control and household insects. We are particularly pleased to find a key (by M. R. Smith) for the identification of important species of ants and brief descriptions of the distribution and habits of 11 species. The important species of cockroaches are also given individual attention. On the whole, the book gives us the impression of having been written by good writers who know entomology from "abdomen" to "Zyklon."

—By F. L. Campbell of Ohio State University and reprinted from the "Annals of Entomological Society of America."

MORE "CANDID CAMERA" JOTTINGS FROM THIRD ANNUAL PEST CONTROL OPERATORS' CONFERENCE OF THE PACIFIC COAST

141 Members Representing 77 Operator Firms in Attendance—Pacific Coast 1941 Operators Conference Tentatively Set for February 20-22, Inc.—Committee Appointed to Investigate Possibility of Having 1941 N.P.C.A. Convention in California—New Officers Elected

Review of the principal part of the proceedings appeared in our March issue.

Commendation for Dr. Herms, Dr. MacLeod, George F. Rader and Others

Since successful pest control operator conferences do not just happen, and since they are usually the direct result of much preliminary spade work and expert guidance when "on location," the C.P.C.M. special organ of the California Pest Control Association, Inc., doffs its "editorial hat" to the foregoing individuals and others who have once more demonstrated that when it comes to putting on a Conference second to none in the country, they stand "Abreast of the best." Too much praise cannot be given them for their efforts, and ditto, say we.

Glowing Tribute Paid Wilbur F. Smith

Because of its sincere phraseology we quote verbatim from C.P.C.M.: "Wilbur's loyalty to our Association—his rare insight into, and recognition of the little things in life which go to make up the bigger things—consideration of the other fellow's feelings—all of these qualities have indelibly imprinted on our memories the true character of one who will never be forgotten."

A. T. Parsons, Senior Regional Director, N.P.C.A., Leads Discussion of the 1941 National Convention

Mr. Parsons pointed out there is a possibility of bringing this to California, and mentioned this is an event of interest to the industry as a whole, as well as to the members of the California Association. Mr. McCauley expressed the sincere belief that the N.P.C.A. is a very important institution to all of the State Associations.

A Smile or Two or Three

As submitted by one of the new Conference Members apropos his reaction to meetings attended:

Herms and MacLeod
And the Faculty Crowd,
Mosquitoes and Germs
Termites and Worms,
Ants in trances
Cyclotron glances,
Beetles and Roaches
Academic approaches
Conference Pestivus
Betters the Bestivus.

First P.C.O.—"What time is it? I don't want to be late for the next lecture."

Second P.C.O.—"What's the difference—at the rate we hold these Conferences it will be 265 years before you graduate."

There was a young P.C.O.
Who up to Berkeley did go—
He attended "Bug College"
Gained the requisite knowledge
And now he is right in the dough.

Good Advertising

"FIFTY DOLLARS EVERY DAY"

Right in Worcester are handouts for old Doc Townsend to envy.

Rats, you say.

Rats to be sure. In one local factory they caused average daily stock damage of fifty dollars. Not foodstuffs, either; shoes. Another plant had forty cases of footwear ruined by rats in a single night.

We'd be the last folks on earth to belittle so noble a trait as Tolerance. If anyone chooses to tolerate rat damage, that is his business.

Just in case he doesn't—
That is our business.

RANSFORD INSECTICIDE CO.

Quotation for the Month

Believe me, the talent of success is nothing more than doing what you can do well, and doing well whatever you do.

—Longfellow.

Case Histories as Related to Fumigation Procedures

By J. L. HORSFALL, *American Cyanamid & Chemical Corp., New York, N. Y.*

EDITOR'S NOTE: *The following paper was delivered at both the Purdue and Louisiana State Pest Control Operators' Conferences as an introduction to a dicussional session.*

THIS discussion may well begin by stating two slogans which should be remembered by the fumigator. The first is one which William O. Buettner has been emphasizing at every opportunity, and it holds so much meaning and is so important that it might well occupy a space on the wall over every fumigator's desk. "Perform every fumigation as carefully as though it were your first fumigation." We know that "familiarity breeds contempt" or, stated in other words, as jobs are handled over and over, there is a tendency to "go through the motions." This is so true of all actions of human beings. The man in a machine shop working at a lathe soon follows a routine, but his thoughts may be some place other than on his work. Under such circumstances accidents happen and he loses a finger, or because of lack of attention, the metal part passed on with an unobserved flaw in it. Every fumigation job may present new problems or conditions, and should demand careful consideration. If, to the slogan which has been mentioned, another one is added, i.e., "Do It Right the First Time," not only would accidents be prevented, but many fumigations would not have to be performed a second time. The writer does not plan to discuss all of the routine steps in fumigation procedure. Case histories have been selected with the idea that they may emphasize specific points and suggestions which will be of interest. The various incidents have been described to the writer by fumigators.

Fumigation should be performed by experienced operators: The first story is told to illustrate the point that only experienced pest control operators should be called in to handle insect infestation in the home. Certainly no layman would go to a garage mechanic, or the employee of an oil company to get relief from an aching tooth. Is this an absurd observation? No more so than the actual circumstance which follows. A family moved into a bungalow and found that it was infested with bedbugs. A friend of the family worked for an oil company, and he was told about

J-O PASTE

To the vermin exterminator who is desirous of extending an outstanding service to his client J-O PHOSPHOROUS PASTE *is* the solution

For the control of rats and roaches this product is widely and successfully used by Pest Control Operators throughout the country.

J-O ROACH TRAP

For use with J-O Paste

Convenient & Safe

TRIAL OFFER

Send $1.00 and we will ship to you postpaid a two-pound can of J-O Paste, with twenty-four J-O Roach traps, as illustrated.

Prices on 25 and 45 Lb. Pails on request

FREE WRITE FOR COMPLETE AND VERY VALUABLE KIT-SIZE ANTIDOTE CHART.

JOHN OPITZ, INC.

50-14 39th Street Long Island City, N. Y.

Manufacturers of Exterminating Products Since 1874

GENUINE RED SQUILL

We have received a fresh supply of True Red Squill tested material imported direct from the African Mediterranean where the most active form grows and is collected. We offer this packed in small metal boxes of 2 and 5 lbs. each. In this packing it keeps for a long time, without deterioration.

We also offer a concentrated liquid Extract prepared from this same tested quality of RED SQUILL, so prepared that it will keep its full strength indefinitely. It is active to the last drop.

RED SQUILL is the safest Rat Poison for use in Homes, Restaurants, Public Places, Mills, Warehouses, Ships, wherever rodents are to be exterminated surely and safely. It is recommended by the U. S. Government. However, success with Red Squill depends entirely upon its quality. We offer the best.

Prices:

GENUINE RED SQUILL POWDER—
2 lb. Sealed Metal Boxes $1.00 each f.o.b. New York
5 lb. Sealed Metal Boxes 2.00 each f.o.b. New York

GENUINE CONCENTRATED RED SQUILL EXTRACT
1 gallon tins $4.50 each f.o.b. New York
5 gallon tins 4.00 per gallon f.o.b. New York
Quarts $1.50 - Pints $1.00 f.o.b. New York

American Fluoride Corporation

151 West 19th St. New York, N. Y.

the trouble. He assured them that they did not need to worry because he could easily help them out. He brought over a quantity of low-flash naphtha which he proceeded to apply liberally with a sprayer to all cracks, baseboards, etc. The members of the family were told they could come back in two hours. The employee of the oil company had scarcely left the house when there was a terrific explosion which bulged out sections of the walls, and a fire occurred which finished the destruction of the interior of the cottage. Surely this family would have been ahead if they had called in an experienced pest control operator.

Knowledge of the life history and habits of insects: The pest control operator should know the fundamental points about the life history and habits of any insect with which he is dealing. A very old building became infested with the Oriental roach. The outside of the foundation was faced with brick. In many places the old mortar had dropped out, making cracks between the bricks themselves and also between the brick facing and the inside foundation wall. This building was fumigated with HCN to eliminate the roaches, but was unsuccessful. The habits of this insect lead it to seek out such hiding places as spaces between the walls, the cracks on the outside of the foundation, or even outside locations near garbage. Under these conditions it is obvious that the gas would not reach them. A fumigation should not have been relied upon as the only means of cleaning up the infestation. This is usually true of infestations by the Oriental roach because of its habits.

The second and third floors in an exclusive high-priced apartment building were fumigated for bedbugs. The whole building was vacated for the fumigation. The families in the first floor apartments had lived there for several years and had never seen any bedbugs. The owner of the building did not think it was necessary to fumigate the first floor and the basement. The morning after the families reoccupied the premises, two bedbugs were found in an apartment on the first floor. It was necessary to vacate the building a second time, and fumigate all floors and the basement. In selling this job, the point should have been stressed with the owner that the habit of bedbugs is to first move upward in walls, but eventually they may also move downward and that, even though none had been seen on the first floor, it would be better to fumigate the entire building. In this case some bedbugs evidently had moved downward in the walls to the first floor, and were out of reach of the gas which was released on the second and third floors during the first fumigation. No further infestation was ever seen after the second fumigation, but the owner had the expense of two fumigations.

Hidden infestation: When the pest control operator is given a job, he should look it over carefully, and size it up to see whether there are any particular features which require special attention. Many times this will save a repeat fumigation. A dwelling house was fumigated for clothes moths with HCN, using an adequate dosage and exposure period. Temperature conditions were satisfactory. Within two or three weeks, many adult moths were noted in rooms on the second floor and in the attic. A second fumigator was called in and he made a careful examination. He found that sparrows had built nests at the junction point of the rafters and side walls, and there was an opening to the outside from the attic at the line of the eaves. Clothes moths were breeding in the nest where feathers furnished an abundance of

FELTON Quality

Kerex PERFUMES

MAKES BETTER FLY SPRAYS

It costs you less than 1c per gallon of spray to use these correct perfumes

These four Kerex Perfumes are most economical to use, and assure you of definite advantages in the successful marketing of your insecticide sprays.

KEREX BOUQUET
A floral odor of proven merit.

KEREX L'ORIENT
A sweet vanilla fragrance.

KEREX M
A clean, "outdoor" scent.

KEREX II
For sprays using the new synthetic insecticides. KEREX II has been perfected in collaboration with the manufacturer of synthetic insecticides and is the ideal product for the purpose.

OTHER FELTON SPECIALTIES!
- **COLDROMES** . . . for perfuming and coloring para and naphtha blocks and crystals.
- **AQUAROMES** . . . water soluble perfume oils, ideal for Theatre and Deodorant Sprays.
- **FORMAROMES** . . . for perfuming Formaldehyde Sprays.

• MEMO • Send for Samples of KEREX PERFUMES Today!

FELTON CHEMICAL COMPANY, INC.
603 Johnson Ave., Brooklyn, N. Y.
Manufacturers of Aromatic Chemicals, Natural Derivatives, Perfume Oils, Artificial Flower and Flavor Oils.
STOCKS IN PRINCIPAL CITIES

Monarch Powder Sprays

Used by Many Leading Exterminating Concerns Throughout the Country

Large Opening in Neck Affords Easy Filling

Screens Powder Perfectly

Made of High Grade Materials

Made in 3 Sizes

No. 40 Has 14 Ounce Capacity

No. 41 Has 9 Ounce Capacity

No. 42 Has 8 Ounce Capacity

Write for Catalog and Price List

THE VANT WOUD RUBBER COMPANY
JERSEY CITY - - - - NEW JERSEY

food. The previous operator had not noted this or fumigated the attic. The nest was destroyed, the opening to the outside blocked by a carpenter, and the house was refumigated. The infestation of clothes moths was eliminated.

Our friend (?) the black carpet beetle: It is probably a fact that more fumigations are repeated in cases of infestation of this pest than with any other insect. Aside from hotels where carpets cover the entire floor space, loose rugs are the general rule. The result is that the larvae of the carpet beetle are generally to be found in cracks at floor level, under baseboards in rooms and closets, or under door treads. Where an infestation is suspected, these larvae may often be found by inserting a wire in the crack and drawing out the lint. The fumigant must penetrate these cracks in order to kill the insects. The following case is described because the procedure may be of some value in such cases. A private dwelling was fumigated, using one pound of HCN per 1000 cubic feet. Live carpet beetle larvae were found after the fumigation. The house was fumigated a second time with HCN, with success, using the following procedure. In the cellar all of the boarding used to block spaces immediately at the top of the foundation between the floor joists was removed. This provided openings from the cellar to the space behind the baseboards or in the walls. The cellar received a dosage of 2 pounds of HCN per 1000 cubic feet and the remainder of the house a one pound dosage. The house was left closed for twenty-four hours. This procedure allowed the gas to penetrate the cracks where the larvae were located from two directions, i.e., between the walls and from inside the room. A complete kill was obtained.

Dosage is based on volume: This would seem to be a very elementary statement, yet certain instances would indicate a misconception as to this point. In a fumigation, the gas will be released into a space having three dimensions, and the volume is the product of these three dimensions. Yet it is a very common thing to receive a letter asking how much HCN to use to fumigate a house 40 feet long and 20 feet wide. No information is given as to the number of rooms or the three dimensions of each. Nor is any mention made as to the pest concerned, or conditions as to contents of the house. Obviously such an inquiry cannot be answered intelligently. This leads to the second suggestion, i.e., determine the measurements accurately — don't guess. The writer has been in the office of a fumigator when a call would come from another pest control operator for him to do a house fumigation. The fumigator would ask about the size of the house, and receive the answer that it was a seven-shot HCN job. It is probably true that some fumigators have been in the business so long that they can come very close to estimating the amount of fumigant needed, but it can easily become a careless slipshod practice which may often lead to necessity of a repeat fumigation.

Sealing: It always pays to spend time on this part of the job and do it well. At best, no dwelling or industrial plant is gas-tight, but the better it is sealed, the tighter it will be and the killing concentration of gas will be retained for a longer time. Various kinds of sealing tape are on the market and are used by various fumigators. These are used for house fumigation or high class industrial jobs, where absence of any marking on trim such as doors and casings is a desirable consideration. This tape is also useful where panes of glass are cracked or broken. In general, it

SEND NOW FOR FREE SAMPLE OF

The New 1940

ANT-"X" ANT TRAP

◆ ◆ MANY NEW FEATURES ◆ ◆

◇ ◇ ◇

◆ 1. No turning or twisting necessary.

◆ 2. Four openings.

◆ 3. Larger trap.

◆ 4. Contents 50% greater than any other competitive brand.

◆ 5. No increase in price.

◆ 6. Increased profits for you on over-the-counter sales—Average 60% on special deals.

Place Your Order for Season Requirements Today

NOTT MANUFACTURING CO.

Manufacturers of

ANT-"X" Ant Traps, ANT-"X" Jelly Bait, RAT-NOTS, MOLE-NOTS, MOUSE-NOTS, ROACH-NOTS, FLEA-NOT—DOGSKOOT

87 Frankfort Street New York City, N. Y.

Like the fellow who sings of the Man on the Flying Trapeze, the Moth isn't as happy as he used to be. • LARVACIDE has shot his mortality rate 'way up. • You see LARVACIDE gets right down into the middle of that deep upholstery, into floor cracks and trunks, and goes right through those stored, folded, thick blankets that may have given him safe refuge. • Those powerful fumes take their toll of Moth in all his stages—including larvae and egglife. • When you go after insects or rodents, you'll like LARVACIDE'S power and penetration, ease of application, no threat to rugs or upholstery—and LARVACIDE'S inseparable self-warning quality that cuts the accident risk. • Cylinders, 25 lbs. and up—also 1 lb. Bottles (in safety cans) 6 and 12 to wooden case —stocked in convenient cities over the U. S. • Write for helpful literature on EFFECTIVE Fumigation.

INNIS, SPEIDEN & CO.

Established 1816

117 Liberty St., New York

Larvacide

CHICAGO • CLEVELAND • BOSTON • PHILADELPHIA • KANSAS CITY

should be stated that the surface to be taped should be dry and also free from dust. Loose windows, which might rattle in the wind, should be tightened with wooden wedges before being taped. Sometimes large cracks are found between a door casing and the brick wall. Such cracks can be filled tightly with cheap cotton batting. The inner surface of the cotton can be wetted with water after it is in place, and this will form a very good seal against the gas. If there is a sewer drain in the cellar floor this should be sealed with wet paper. Usually such a drain is trapped, but the fumigator cannot always be certain of this and gas might leak through the drain into another building. Such instances have occurred. In the case of rough buildings, where neatness is not a consideration, the old standby of flour paste and newspapers is often used. A sealing material is also used in flour mills by making a putty-like mixture of flour and lubricating oil. This material, when used about windows and doors, falls away readily when the building is opened for aeration.

Airing out the building: So much has been said and written on this point by Dr. C. L. Williams, U. S. Public Health Service, and by others, that all fumigators should be well informed on the subject. However, there are still fumigators who follow practices which cannot be classed as good fumigation procedure. No one should be permitted to sleep in a house on the night of the same day it has been fumigated. It follows as a corrolary that it will almost be necessary for the fumigator to have the house in his possession for twenty-four hours. Many good fumigators now insist on this, but there are far too many who do not.

Probably the conditions which present the greatest difficulty for thorough airing and therefore must be most carefully watched are cases of cold, rainy days in summer and cold winter weather. An instance comes to mind of such a cold winter day following the fumigation of a twelve-family house with cyanide. After the fumigation and a preliminary airing, the fires were started. The windows were closed, and the house heated up for about three hours. The house was aired and again allowed to heat, this time for about five hours. It was necessary to repeat this procedure for a third time before tests indicated that the gas was entirely dissipated from mattresses and furnishings. Another instance on a damp summer day developed a condition which should be watched. Beating of mattresses and rugs, and use of fans cleared these of gas after a considerable period of time. But even after the gas was entirely dissipated from the mattresses, there was a strong concentration of gas in the rooms. It was found that this was due to gas absorbed by the walls, dampened by the weather, and it was necessary to build a fire, heat up the house, and dry out the damp walls in order to complete the aeration.

Before the fumigator opens up a building for aeration, he should look over the neighboring situation and be sure that conditions are such that the gas will not create difficulties with reference to nearby properties. A situation comes to mind which will emphasize this point. A row of apartments was fumigated and the aeration began about six o'clock one summer evening. Windows and doors were opened in the usual manner, but very little breeze was present. The intake of the air-conditioning system of a theatre faced the rear of the fumigated apartments and soon the gas was being drawn into the theatre, causing serious discomfiture to the patrons. As soon as this was called to the fumigator's attention, he placed two powerful fans at the back of the house and drove the gas in the opposite direction. The theatre was soon cleared of gas, and no one was any the worse for the experience. This illustrates the careful check up which should be made with reference to the immediate neighborhood of a fumigated premise.

Testing for residual HCN: There are two methods which may be used by the fumigator to check on aeration after fumigation with HCN. The apparatus developed by the Mine Safety Appliance Company is designed to give a direct reading of the concentration of gas in a space or, when fitted with a special tip, it may be used to test for HCN in mattresses and furniture. This testing device uses glass ampules containing absorbed chemical indicator. This chemical deteriorates with time, so that the ampules are sensitive for only about three months. They are dated when they are sent out. This appears to be the serious limitation to the device, and the fumigator who relies on this apparatus to give him accurate information about aerated furniture and bedding might well test a given lot of ampules by means of a small amount of calcium cyanide in a bottle before he takes the apparatus out to use it. The methyl orange-mercuric chloride test papers furnish an economical and dependable device for determining presence or absence of residual HCN. One of these may be suspended in air or laid on a mattress for a given period of time and the color change, if any, noted. If the color of the paper changes to a deep red in ten seconds or less, the indicated concentration is equal to, or greater than 800 parts per million. If the color change is only to a very faint pink in eight minutes, the concentration is approximately eight parts per million and well within the safe range. The bottle containing the papers should be kept tightly closed and not exposed to the gas, or all of them may become colored and be of

SODIUM ARSENATE
SODIUM ARSENITE
JUNGMANN & CO.
INCORPORATED
157 Chambers Street, New York
Barclay 7-5129-30

"HOUCHIN'S" WHIRLWIND BLOWER
Made of Heavy Durable Gold Lacquered Tin

Holds 4 Oz. Powder Screened Cover
IN GREAT DEMAND BY LEADING PEST CONTROL OPERATORS
WRITE FOR DETAILS
Thos. W. Houchin Corp. • 87 Ferry Street Jersey City, N. J.

no further service. The papers should be in a moist condition when used. If they are dry, a satisfactory color will not be obtained. This is the limitation of the test paper method, but, contrary to the previous device, the operator can easily determine whether or not the papers are in a satisfactory condition. The writer believes that every fumigator who uses HCN should employ the methyl orange - mercuric chloride papers to check on aeration, and thus make certain that this important part of the job has been thoroughly carried out.

Germany Is Allowed to Get Rat Poison

British Control Also Permits Shipment of Spoiled Cheese

London.—The British contraband control announced today that half a ton of spoiled Gruyere cheese and a large quantity of rat exterminator consigned to neutral countries adjacent to Germany had been allowed to proceed for re-export to Germany.—N. Y. Times.

No two other things differ more than "hurry" and "despatch." Hurry is the mark of a weak mind, despatch of a strong one.
—Colton.

What the Pest Control Industry Is Doing for Entomology

By W. E. McCAULEY, *Illinois State Natural History Survey, Urbana, Illinois.*

EDITORS' NOTE: *Paper presented at the Third Annual Pacific Coast Pest Control Operators' Conference, Berkeley, California, February 23, 1940.*

I'M HAPPY to be here with you. I've always wanted to see the "wonderful west" that furnishes those of us in the midwest with the most enjoyable part of our diet—fruit. Since my association with entomologists and the pest control industry I've had a great desire to know more intimately those who instigated and carried along the now well-known termite investigations. More recently I've read of your problems and work dealing with other household and industrial pests and I wanted to see for myself how you do things out here.

Another reason for my being here is because of the personal enjoyment as well as the technical stimulation that I have gained from my association with the men of your industry in the eastern states. My contact with those in your industry, I feel, has given me an immeasurable benefit as far as my own work is concerned. Of course, I got many valuable experiences working for a P.C.O. I spent some time fumigating houses while a part-time graduate student. I've also had the thrill of trying to think like a rat, that I might know how to place baits and traps. Such brief experience has, I feel, aided me in realizing the problems you face. But it has been the close contact with the P.C.O. that has sharpened my interest in the problems confronting your growing industry.

It is my intention today to call to your attention some of the things

INCREASED BUSINESS MEANS
INCREASED ACCIDENT HAZARDS!

PROTECTION and SECURITY
May Be Had Through Dependable

INSURANCE
FOR THE
PEST CONTROL INDUSTRY

IMPORTANT: The cost of complete insurance coverage is slight when compared to potential financial losses which you may incur as a result of inadequate protection.

Policies issued in REPRESENTATIVE AMERICAN STOCK COMPANIES operating in all states.

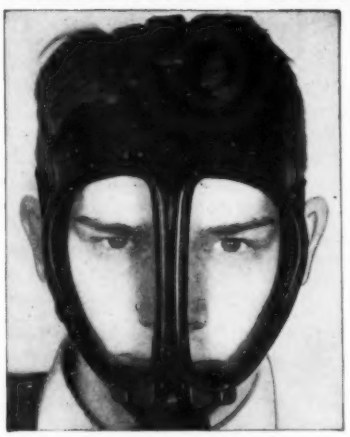
Public Liability *Workmen's Compensation*
Termite Guarantees *Products Liability*
And All Allied Lines

Cooperating with National and All Local Pest Control Associations.

MEMBER NATIONAL PEST CONTROL ASSOCIATION

B. & D. A. WEISBURGER
1440 BROADWAY NEW YORK CITY
Dependable Insurance Service Since 1915

LEADING FUMIGATORS
ARE
ADOPTING
ACME
FULL
VISION



Acme Full Vision Gas Masks, equipped with Acme Type HCN Canisters, are rapidly being adopted by scores of the largest fumigators and gas mask users in the country.

FULL VISION, an exclusive Acme feature, affords the wearer unobstructed vision, and provides greater safety and efficiency.

Write for Folder M387 on Acme Canister Masks.

Acme Protection Equipment Co., Inc.
Manufacturers of Respiratory Protective Devices
3605 Liberty Ave. Pittsburgh, Pa.

your industry has done and is doing for the old profession of applied entomology. This science was founded and has thrived in the United States chiefly in connection with production of crops—in other words it has been an agricultural science. Such a condition was natural in a nation which was founded upon its agriculture. Pests of agriculture had to be controlled and as new crops were developed new pests arose and entomologists were called upon to combat them. It is interesting to note that the increasing demands resulted in **increasing support of official research institutions.** Such institutions have been, until recently, the chief outlet for those trained in the field of entomology, therefore it is only natural that those institutions training entomologists have stressed those phases dealing with the agricultural pests. The literature dealing with entomology has taken the same trend. There are many times as many texts dealing with agricultural pests as with industrial or household pests. It is true, of course, that the relationship of insects to public health did receive attention but not in proportion to their importance, and for a great while all this work was done by official entomologists.

The demand for better insecticides for agricultural pest control resulted in the first commercial entomologists being employed by companies developing and selling such materials. Unfortunately there seems to have developed a feeling among official entomologists that those men who entered the commercial field were selling themselves "down the river." It soon became evident, however, that a vast phase of entomology had been largely overlooked by official entomologists or because they were being supported by agricultural interests they necessarily did little about the industrial and household pests. True, of course, many bulletins and circulars were published largely for use by the housewife in dealing with pests annoying in the home. The problems and methods set forth in many of these publications are shockingly simple. Less than a decade ago it was common practice for such publications to encourage home fumigation with HCN. Accidents were common. Little recognition was given to the fact, well known to you, that insect control in factories, office buildings, institutions, bakeries, stores and even homes required special apparatus, training and knowledge of processes or types of construction. It is this gap which gave the P.C.O. a good wedge in insect control work despite available governmental instruction; and which with the more or less orphaned municipal rat and house problems is the foundation upon which the pest control industry rests. At first the entomologists were undoubtedly a bit skeptical, yes, even a bit jealous of some of the work being done by the P.C.O. Many and lengthy have been the discussions about the unethical practices and exaggerated claims made by shyster exterminators and "fly - by - nights." Just as lengthy could be a similar discourse about those engaged in scientific work if anyone cared to go into the matter carefully. But be that as it may, we have an industry, a good and rapidly growing industry which the American public could not well get along without. The relationship of your industry to public health, building maintenance, textile and food processing industries, is a very fortunate one.

Entomologists are rapidly awakening to the scope of the field. Consideration is being given to a special curriculum for students who may find their way into that field. In this connection I feel that a student preparing to enter the pest control industry

Announcing

A New Bulb Market for You

Many householders do their own service work. Since you can't sell 100% of them service, you can sell them the "makings." Help yourself to a new source of easy profit by selling them a New Centro - bulb Jr.—a 4-oz. bellows having all the features of the large professional Centrobulb.

1. Heaviest metal nozzle with deep cut thread.
2. Largest opening for easy filling.
3. Stay tight screen to avoid clogging.

Write for our surprisingly low prices and start making these extra profits at once.

Central Rubber Products Co., Inc.

821 Broadway New York, N. Y.

PYRIN

. . . the low-cost insecticide concentrate, combining the best features of pyrethrum and isobutyl undecylenamide to give you effective killing power at a saving. Try it!

STIMTOX REG. U. S. PAT. OFF.

. . . for efficient and economical industrial dusts. The fineness of its grinding, along with its superb pyrethrum activity, means first-class insect control. Used by many Pest Control Operators. Ask for a sample.

John Powell & Co., Inc.

114 East 32nd Street

New York, N. Y.

should not be over trained in entomology at the expense of business training, zoology, engineering, bacteriology, and especially in chemistry. Certainly a well-trained entomologist would have to be quite versatile to survive in the pest control field. Entomologists who appreciate the potential amount of work in pest control, are, I believe still very much in the minority. I personally believe that this industry is rapidly becoming one of the moving forces in the field of applied entomology. I know I am not alone in this belief. Certainly a strong national organization with a united front will continue to do more than any one other thing to keep this industry growing. This industry is certainly impressing entomology upon the minds of the public. "Termite" is almost as common a word now as "rat" although the true identity of the insect by that name may be a bit obscure. Those of you in the industry undoubtedly feel grateful for the opportunity to participate in such short courses or conferences as this. But, I am sure, those on the staff are just as happy to be here as you are. That is certainly the spirit of Professor Davis and others of us who have participated at Purdue for four years. I certainly would go on my vacation time as I'm doing here rather than miss the opportunity to be there. Your candid discussions and problems are a challenge which stimulates my thought. The effect of this industry upon the entire field of applied entomology is essentially the same, though probably a bit more indirect in its action. It is acting as a sort of "shot in the arm" to entomology. Certainly the entomologist can no more afford to ignore the P.C.O. than the P.C.O. can afford to pass by the technical facts available by entomologists. A gap is still sometimes evident between the theory or facts available and their exact application to the problems you meet in your work. For example, a very well-informed entomologist not long ago complained to me that a certain P.C.O. firm was quoting an exhorbitant price for ridding a friend's home of firebrats, **Thermobia Domestica.** "Because," he said, "the insects are only present in one room." I think there are several object lessons for any entomologist in that statement. Have any of you ever seen an infestation of firebrats confined to a single room? We **don't** have such a situation in Illinois. The **entire** house **must** be considered. Another thing this entomologist failed to realize was that the initial price had to cover a completely satisfactory job. Even if the P.C.O. had to make a trip or two to assure the customer that the lace wing fly that was accidently found on the curtain was not a firebrat which had survived treatment. The thing the entomologist—shall I say of the past — usually thinks about is how much the necessary material will cost and proceeds to forget the other expenses involved in operating a business. I know that cost account records show that the cost of materials used in pest control are not a major part of the operating cost. A better appreciation of this one fact would relieve a lot of tension in the minds of some entomologists who feel all P.C.O.'s are racketeers. I hasten to say, however, that I'm speaking of legitimate pest control satisfactorily done on premises in need of service and do not intend for a minute to condone the practice of securing money for treatment poorly done or not done at all, and many times on premises where no need exists in the first place. In other words encourage legitimate operation with legitimate prices.

One cannot but be impressed with the faith and confidence which is often displayed by clients of the P.C.O. Such trust demands the highest form

DEATH TO BED BUGS with CIMICIDE

• Cimicide, diluted 1 to 25, provides effective control against bed bugs; pleasant smell; non-toxic to humans.

PENICK PYRETHRUM—high pest-destroying potency; granulated and powdered (extremely fine).

PENICK'S Powdered TIMBO and DERRIS ROOTS—for improved roach and insect powders.

ROTENONE SOLUTION—ready for immediate use, steps-up Pyrethrum spray toxicity.

RED SQUILLS (Powdered)—kills rats effectively. Standardized and tested for toxicity.

RODINE—Liquid Red Squills.

Send for Descriptive Booklets

S. B. Penick & Company 132 Nassau St. New York, N. Y.

Stop TERMITE DAMAGE with CHIPMAN DRY SODIUM ARSENITE

• Stops and prevents termite entrance into buildings from parent soil colony. Used for treating foundation timbers, infested beams and sills. Also protects unpainted woodwork. Completely soluble in cold water. May be used in original dry form.

ROTENONE EXTRACTS

• Rotenone and its accompanying resins in the most toxic and available form (extract). In strengths up to 24.75% toxic cube resins, including 6.75% rotenone.

Write for Literature and Prices

MEMBER NATIONAL PEST CONTROL ASSOCIATION

CHIPMAN CHEMICAL CO., Inc.

BOUND BROOK, N. J. CHICAGO, ILLINOIS

PALO ALTO, CALIFORNIA

When Writing to Advertisers Mention "Pests"

of dependability and business trustworthiness. This undoubtedly will tend to raise the standards of entomology. It should enhance the study of this old science with higher goals, as customer-operator relationship becomes better understood.

One of the greatest contributions that the pest control industry has made to entomology is the stimulus it has given to research. The new demands for materials and especially for methods which your problems have made is setting new programs of investigation in motion. The increasing amount of collaboration between your industry, the commercial and the official entomologists is, I believe, a very wholesome state which cannot but result in more standardized materials and methods for future use.

Before closing I should mention that this industry has developed to a point, in some sections of the United States at least, where regulation is being sought or has been sought by men within the industry. This is a much healthier situation and should result in a more unbiased type of law than that which results without proper consideration and understanding on the part of those responsible. It is unfortunate that regulatory laws are often passed by those not familiar with the problems of the industry.

I've enjoyed being with you and hope to meet others of you before I leave.

WHAT'S NEW IN PEST CONTROL-PERSONALS

Comes one from Prof. J. J. Davis—"In a test for my winter course students recently I asked to explain the use of carbon bisulphide for the fumigation of the farmer's bin and to indicate any special precautions. One of the answers made was 'Be very careful in using this ($C S_2$) because it is very explosive and if you are smoking or light a match while you are using this fumigant, you probably will never use it again'." Off the record, we think that even a few pest control operators may profit by the descriptive answer.

"Farm Research" — A quarterly bulletin issued by the New York State Agricultural Experiment Station, Geneva, N. Y., is available free to those who will write the station.

Their many friends will be sorry to learn that John Potts Linn of Omaha, Neb., was stricken with a heart attack and Lee Christensen of East San Diego, Calif., seriously ill. Mr. Linn is now back home after his sojourn at the Methodist Episcopal Hospital and will have to take it easy for a time. Mr. Christensen reports that he is far from up to par.

STRANGE NATURE TALES

Bats catch mosquitoes and other insects by means of an ingenious trap formed by a web of skin between hind legs and tail.—Science Service.

The Guarantee Exterminating Co., of New York, has a booth at the New York Flower Show during the week of March 11-16. Termites were featured and S. S. Rosen, president of the company, reports many favorable leads.

Mr. and Mrs. Max J. Levy, of St. Paul, Minn., are enjoying their annual sojourn down in the Ozarks. Headquarters are Hot Springs, Arkansas. Max reports his knocking off of a few of the "bugs" at bridge, golf and races mainly a control measure and not an exterminating fete.

Oscar G. Buettner refuses to allow his son "Bill" to run away but holds him in town by going off himself on one of his usual South American cruises. Incidentally it does not pay "Bill" to stay in town as he experienced a "stick-up" and parted with $61.00. The thief was caught and

For Rat Extermination

CALICO BAIT

Kills All Rats in 4 or 5 Days

A mixed Cereal Bait combined with PROVEN LURES

A Safe Powdered Squill Product

READY TO USE - DOUBLE STRENGTH

10 lbs. Bulk	$3.00	50 lbs. Bulk	$ 7.50
25 lbs. Bulk	4.50	100 lbs. Bulk	12.00

Or in 8 oz. Cans, 2c per lb. higher
DELIVERED

For Sure Extermination of Mice

CALICO SEED

Double Strength

Kills All Mice in 4 or 5 Days

That's Our GUARANTEE!

10 lbs. Bulk	$4.00	50 lbs. Bulk	$12.00
25 lbs. Bulk	7.00	100 lbs. Bulk	22.00

Or in 8 oz. Pour Spout Cans, 2c per lb. higher
DELIVERED

Choice of Anise, Chocolate, Butter, Cheese or Rodium lures. Anise furnished unless otherwise specified.

ORDER NOW!

The Bagnall Company

Martin City, Mo.

FACTS

About Per-Mo Mothproof Liquid

Per-Mo is easily applied to rugs, carpets, over-stuffed furniture, drapes, blankets, wearing apparel and other woolen articles. Chemists' tests prove that Per-Mo becomes an integral part of the fabric, the same as a dye. Its efficacy is not impaired by dry-cleaning, washing, exposure or use. Even years after the application of Per-Mo moths cannot injure any fabric so treated.

WHAT SOME USERS OF PER-MO SAY

We are proud to say that we have used quite a bit of the Per-Mo mothproof material, and so far, have found it to be very satisfactory.—Pest-Control Operator.

Since using Per-Mo in this building five years ago we have never seen any sign of moths. We cannot recommend your product too highly.—Apartment Manager.

Since having my entire house treated with Per-Mo I've had no fear of moths whatsoever, and it has been a joy and help. I can most sincerely recommend Per-Mo.—Housewife.

Per-Mo Mothproof is a colorless and odorless liquid, that is applied to any woolen fabric with a spray-gun, either electrically or hand powered. Write for full particulars.

Salesmen and Jobbers Write for Exclusive Territory.

PER-MO MOTHPROOF CO.

3729 Virginia., Dept. M. Kansas City, Mo.

money will probably be returned. "Swell sensation to have a gun held at your ribs," says Bill.

Max Rukin of Industrial Fumigating Co., Chicago, Ill., pulled a unique St. Patrick's advertising folder on March 17th.

NEW ADDRESS: Givaudan-Delawanna, Inc., dealers in aromatic chemicals have moved their executive offices and service laboratories to 330 West 42 Street, New York City.

The Hudson Exterminating Co. announces the removal of its offices and laboratories to 444 Eighteenth Street, West New York, N. J.

We have finally located Bartlett W. Eldridge and discovered that he had hibernated to his farm in New Hampshire and not Quebec.

Mr. H. Youngman, formerly of Anderson Exterminating Co., Brownsville, Texas, now operates the Acme Pest Control Co., Corpus Christi, Texas.

Congratulations to Larry McKenna, president of the A. C. Exterminating & Chemical Corp., of Cleveland, Ohio, who has recently announced that the firm has moved into their new quarters, at 1603 St. Clair Avenue, in Cleveland. This is the third time in five years that the firm has doubled their office and manufacturing space. Best of luck.

"This Week," which forms the magazine section on Sundays of some of the leading newspapers, printed in the March 10 issue a very splendid story entitled "Pest Control, New York Style." This article might well be utilized as a reprint in many other publications, and it is suggested that a copy be obtained.

The Hudson Exterminating Co. announces the removal of its offices and laboratories to 444 Eighteenth Street, West New York, New Jersey. Congratulations and good luck.

The population of New York City continues to increase, and it is said that some of our firms are anxious to make sure that their pest control businesses will continue for many years. Mr. and Mrs. Sidney Wimmer tell of the birth of a son on February 10, who shall be called Herbert Lawrence Wimmer. Mr. Wimmer, it will be recalled, sent a telegram to Purdue University during the time of the conference, explaining why it seemed impossible for him to be with us, and we are happy, therefore, that the Majestic Chemical & Exterminating Co. will continue. Al Atlas of the Abbot-Madison Company also reports that Howard Theodore looks as if he will go into the exterminating business when he grows up, Last, but not least, there comes the notice that on March 5, there was born to Mrs. Chester Schwimmer, a son, whose name will be Steve Allan. Mr. Schwimmer is associated with Herbert Meyer in conducting Fumex Sanitation Company at Jamaica, Long Island. Our best wishes go to all, and naturally, our congratulations to the happy mothers and fathers.

The Eight Annual Convention of the National Pest Control Association to be held at Hotel Claypool, Indianapolis, Ind., next October is commanding much attention from the convention committee that promises a better program than ever in that the more intimate problems of the industry will be the keynote of thought throughout. If any in the industry would like to offer suggestions, the note is your cordial invitation to submit questions or problems by contacting the secretary of the association at 3019 Ft. Hamilton Parkway, Brooklyn, N. Y.

LOCAL ORGANIZATION NEWS

A Plague of 'Hoppers Is on Us

Dozen Hatch Out In a Mossery at Tudor City

Daniel Robert Maue, who used to ghost-write World Fair's speeches for Grover Whalen, reported today by telephone to the World-Telegram that he has become the victim of a plague of grasshoppers in his apartment at Woodstock Towers, Tudor City.

Mr. Maue said that his hobby is collecting moss. Today when he looked at his mossery he saw some tiny creatures hopping about, and discovered that they were baby grasshoppers—about a dozen of them. He said he assumed he had acquired a piece of moss with some grasshopper eggs in it.

"I thought it was interesting," he said, "in view of the blizzard they're having down South. I intend to offer the grasshoppers to the Museum of Natural History."

New England Pest Control Association

This active sectional association has been a little late in telling of the interesting meeting which was held on January 30th at the Hotel Lenox in Boston, Mass. President Charles W. Houghton presided.

A complete report of the Purdue Pest Control Operators' Conference was made by George R. Elliott, Bartlett W. Eldredge and Charles W. Houghton. The feature of the evening was the showing of the new film on mice prepared by the Bureau of Biological Survey and a discussion of the work of the Bureau of Biological Survey by George W. Lay, Walter S. Dykstra and George Dyer. (Incidentally Mr. Dyer was given a round of applause as announcement was made that he has joined the ranks of the married men — no more staying out late.)

The next meeting of the New England Pest Control Association is to be held at Hotel Lenox on Tuesday, April 2nd, when among those who are to participate will be Walter S. McCloud, President, and William O. Buettner, Secretary of the National Pest Control Association. All firms of the pest control industry of New England are invited to attend.

Connecticut Pest Control Association

The next meeting of the Connecticut Pest Control Association will be held at New Haven, Conn., on Monday, April 15th. All pest control operators of the state of Connecticut are invited to attend. The guest speaker will be William O. Buettner, Secretary of the National Pest Control Association.

New York Pest Control Association

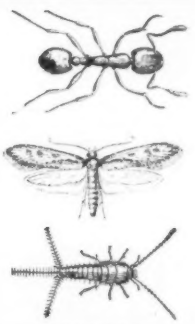
Over thirty attended the regular meeting of the New York Pest Control Association held at the headquarters of the Association at 7 East 44th St., New York City, on

Confucius say. . .

Rat in glue
Better than rat in stew.

It's new this glue. Holds them like a bear trap. Free sample of **Rat Lure** that can be mixed with any bait, with every order of glue.

H & H CHEMICAL CO.
When business is lousy—it's good
3960 FILBERT ST. PHILADELPHIA, PA.
GLUE RAT LURE SEEDS



CHEC TIME TESTED TOXICS

- ANT PASTE *for grease and sweet ants*
- SUPER CONCENTRATE *for mothproofing*
- SILVERFISH PASTE

THE CHEC CO. v 5923 Julian Ave. v St. Louis, Mo.

March 19th. President "Bill" Buettner presided.

On the general theme of "For the Good of the Order," everyone present took part and plans were carefully prepared for an active program under the revised set-up that will mean the appointment of two members at each meeting who will arrange for the program at each succeeding meeting. Ken Tompkins and Jack Bemosche will have charge of the May meeting.

A demonstration was given of new termite equipment by A. W. Appton.

Among those present were: Justin Simon, General Exterminating Corp.; N. Fremed, Sameth Exterminating Co., Inc.; M. J. Breecher, Federal Vermin Exterminating Co., Inc.; A. Bayer, Sudex, Inc.; J. I. Drucker, Banex Exterminating Co.; John Norris, John Norris Company; Donald A. Lederer, Adolph Isaacson & Son, Inc.; Steve Rohdi, Excelsior Exterminating & Chemical Co.; Morris Feldman, Columbia Exterminating Co.; W. J. Shrimplin, Rose Exterminator Co.; W. O. Buettner, Oscar G. Buettner & Son, Inc.; M. E. Blinder, Josephson Disinfecting Co., Inc., Oriental Exterminating Corp.; William Farrell, Effective Exterminating Co.; Raymond Sulzer, Gladius Exterminators; B. Stadholz, Industrial Fumigation Co.; Philip Haller, Virus Ltd., Inc.; K. W. Tompkins, Bliss Exterminator Co., Inc.; Stanley Fox, Bliss Exterminator Co., Inc.; M. A. Gladstone, Abbot-Madison Corp.; Arthur O'Connor, Security Exterminating Corp.; J. J. Hess, Exterminating Services Corp.; H. Kaplan, Greater N. Y. Exterminating Co.; J. J. Pero, American Exterminating Co.; Jack Bemosche, Evins Exterminating Co.; Harry Rosenfeld, World Wide Exterminating Co.; W. J. Parker, M. L. Heminway, A. Hautt, P. Pessin, Zenith Exterminating Co.

Milwaukee Pest Control Association

A dinner meeting of the Milwaukee Pest Control Association was held at The Elks Club in Milwaukee, Wisc., on Saturday, March 23rd, on the occasion of the visit of President Walter S. McCloud and Secretary "Bill" Buettner of the National Pest Control Association.

Good fellowship and general discussional period followed the dinner. The principal subjects of conversation included ethics, advertising with emphasis of the classified telephone directory, insurance, fumigation operations, federal housing projects and legislation.

Among those present were Walter and Harry Last, John Cort, Henry Turrie, Harvey and Ellsworth Klein, Harry Hammond, "Bill" Buettner and Walter S. McCloud.

St. Louis Pest Control Association

A special meeting of the St. Louis Pest Control Association was held Monday evening, March 18, 1940.

Meeting was called to order by President Cassilly at eight ten p. m. The first order of business for the evening was plans and preparations for the meeting of pest control operators to be held the following day at Columbia.

Transportation was arranged so everyone desiring to attend the meeting would be taken care of.

Discussion on the exhibit which was given at the St. Louis Flower Show continued. The complete report on the cost of the exhibit to be presented by the secretary at the next regular meeting.

A motion was made by Mr. Raley, seconded by Mr. Exner that a check for $5.00 be sent to Miss Tons for additional work for the preparations for the booth and the state meeting.

The secretary was instructed to send seven hundred pieces of the literature which was used at the exhibit to Mr. Wm. O. Buettner to be used in the service letters.

There being no further business the meeting was adjourned at nine twenty-five p. m.

Greater Kansas City P.C.O.'s

The P.C.O.'s Association of Greater Kansas City met on March 25, 7 p. m. at the Pickwick Hotel for a get-together dinner as well as to discuss pest control service problems.

It was a pleasure to have Dr. E. G. Kelly, Extension Entomologist from Kansas State College, Manhattan, Kansas, with us as a guest speaker. Mr. K. Backus, Wyandotte County Farm Bureau Agent was also present.

Dr. Kelly discussed various products used in pest control service, also better methods of handling various pest problems. Mr. Backus mentioned some of his work in regard to pest control problems. Later a lively discussion took place in regard to bettering ourselves in every way.

The following members were present: G. Gates, Gates Exterminating Co.; Phil Burnett and Thomas Wilkinson, Getz Exterminators, Inc.; R. Schuyler, Termite Exterminating Co.; T. Nichols, A. B. C. Termite

"POSITIVE" - "SAFE" and "SURE"

USICO SILVERFISH CONCENTRATE

"FACTS"

KNOWN WORLD WIDE!

(1) It will exterminate all Silverfish in building completely and properly treated within 40 days; ONE TREATMENT will protect against reinfestation for THREE YEARS.

(2) Harmless to human beings and animals, simple to apply, no tearing up or marring woodwork, yet placed away from any chance of removal. No inconvenience to tenants whatever.

(3) One pound will treat completely — three 2-room apartments, two 3-room apartments, or a basement room 20x20.

(4) It has fulfilled every claim made for it, under the worst conditions known. Write for testimonials.

(5) "NEW LOW PRICES"— $1.00 per pound, f.o.b. Seattle, Washington. Minimum amount 10 pounds. Shipped express.

(6) *Don't envy the exterminator who can guarantee the above performance, be one!!!*

U. S. INSECTICIDES CO.

412 Hoge Building Seattle, Washington

A NON-POISONOUS RAT KILLER

15c PER POUND IN ONE-POUND TIN CANS

For Safety, Effectiveness and Economy

—USE

SUR-RID RAT KILL

Try It—It Saves Time and Money

SUR-RID Rat Killer is tested in our own laboratory on both wild and tame rats and we GUARANTEE the Killing Power.

SUR-RID Rat Killer contains meat, cereals, vegetables and just the right amount of a tested killing agent. It is especially appetizing to rats and mice as there is only an odor of fresh meat and vegetables and there is no raw odor of chemicals; four distinct lures, MEAT, FISH and CEREAL and CANTALOUPE, packed either assorted or of one kind to a case, which contain three dozen one-pound cans.

Due to the increase in the sale of this Rat Killer, we are reducing the price as follows:

	Per Dozen
Three Dozen Lots, labeled	$2.00
Gross Lots, labeled	1.90
Gross Lots, no label	1.80
The half-pound size, packed five dozen to a case	1.25

Freight Prepaid on Gross Lots, Less Than Gross Lots F. O B. St. Louis, Mo.

SUR-RID PRODUCTS COMPANY

Manufacturers

(FORMERLY REAL EXTERMININATING PRODUCTS CO.)

455 PAUL BROWN BLDG., ST. LOUIS, MO.

Co.; F. Andrews, Andrews Exterminating Co.; N. Pulley and F. Vasieck, Geo. W. Rockwell Exterminating Co.; D. E. Reck, K. C. Pest Control Service; A. L. Linck, Paramount Exterminating Co.; O. Schaffer, Per-Mo. Moth-Proofing Co.; Al Cossetta, Pests.

Associated Pest Control Association

The Associated Pest Control Association of Los Angeles met for their regular meeting at Eaton's Chicken House on March 13th. This was known as 'Termite Night" and discussed at this meeting were a series of questions that were prepared in advance, some nineteen pertinent questions that brought out essential problems of termite control.

This association has been fortunate in securing the services of Dr. W. Dwight Pierce who is conducting a course of Study Lectures on six Wednesday evenings. The schedule follows for this course to be held at 936 W. Washington Blvd., Los Angeles, Calif., beginning at 8 P. M. on:

Wednesday, March 6th—'How We Classify Insects."

Wednesday, March 20th—'Disease Carrying Insects of Home and City, and Their Control."

Wednesday, March 27th—"Destroyer of Wood Products in Home, Factory and Store."

Wednesday, April 3rd—"Injury to Clothing, Furs, Furniture and Woodwork."

Wednesday, April 17th—"Termites."

Wednesday, April 24th—"Fumigation and Chemical Controls."

This course is for the benefit of the members and their employees. To members, a paid-up membership card for 1940 is the admission. To other members of the member firms, or employees, the course is available for the sum of $2.50.

District Meetings of California Pest Control Association

The election in District No. 2 was held February 8, and William Hogan of Pasadena was elected Chairman, and J. E. McNatt was elected Secretary and Treasurer. The district approved the educational program for the monthly meetings that had been sent out by the State Board of Directors, and laid plans for a very active year.

The members of District No. 7 held a meeting at Ada's, in Burlingame, on February 8, and those present were Messrs. Peterson, Davies, Williams, Parsons, Menard, Hackley and Montgomery — also visitors Brown and Cruikshank of Vapo Chemical Co. President Menard presided.

Mr. Davies suggested the compiling of a combined motion picture reel of pests, primarily for showing to the public, and offered to make a start toward this by supplying suitable parts of the termite reel shown by him at the Annual Convention in Hollywood. (The writer had the pleasure of viewing this picture, and it is without doubt the finest motion picture of insect life he has ever seen.

New England Termite Problems

EDITOR'S NOTE: *Observations by Neely Turner, Assistant Entomologist, Connecticut Agricultural Experiment Station, New Haven, Conn., at the Seventh Annual Convention of the National Pest Control Association last October.*

THE termite problem in the Northeast is considerably different than in the South and far West. Here small dwelling houses cost from $3,000 to $10,000, including plumbing and heating, and most of them are substantially built. Practically every permanent dwelling has some sort of a basement, and with few exceptions the houses are on substantial foundations.

Termite infestations in these buildings are being reported in large numbers. Except in a few isolated cases, the damage to any one building has been relatively small. We have had some unusual conditions which affect the use of certain types of treatments.

In parts of New England the soil is heavy loam with comparatively shallow rock ledges. Termites seem to follow these ledges and of course may enter houses erected thereon. In these and some other similar localities the use of soil treatments has not been entirely satisfactory due to (1) poor penetration and (2) ineffectiveness of individual compounds used for treatment.

An analysis of more than 1,000 cases of infested buildings and an accurate case history record of almost 100 buildings has indicated (1) that use of complete metal termite shields has been highly satisfactory in Connecticut, (2) that many of the buildings treated with soil poisons alone have been re-infested regardless of the material used, (3) that the average carpenter has done very poor termite control work, (4) that most of the soil poisoning, whether done by homeowners or so-called termite control experts, has been very poorly done and (5) that we believe that a system of comparatively inexpensive structural changes accompanied by a careful and thorough soil treatment is logical in about 7 out of 10 infested buildings in this area.

Advertising. . . .

"There are many forms of advertising . . . each serves some definite purpose better, more effectively and more economically than any other form."

Perhaps one of the most effective means of direct advertising is "Pests" . . . because it not only creates business but it also makes friends . . . builds good will.

It can create interest in a product or service—it does create confidence . . . it does keep your firm or organization before the customer or prospect between a salesman's calls . . . and in its own way, it does make sales, and is the printed representative of your business.

"Bad eyes never see any good."

FOR HIGH KILLING POWER
use
"RO-CHEX" PHOSPHOROUS PASTE
THE PASTE WITH THE ODOR THAT LURES
Free Offer: With every order for 10 1-lb. cans of "RO-CHEX" costing $4.75, you receive one dozen Toilet Bowl Deodorants, 100% PARADICHLORBENZENE; or one dozen perfumed Urinal Blocks.
"RO-CHEX" also packed in 5 ounce cans.
Prices on Larger Quantities Uniformly Low
GREENPOINT CHEMICAL CO.
981 Myrtle Avenue Brooklyn, N. Y.

SPECIAL OFFER
For This Month Only
FLU—MOUS—SEED
Thallium Impregnated Canary Seeds.
Unsurpassed as the Most Effective Mous-Killer
10 Lb. - - $ 3.00 6 Double Baited Ant Traps Free
25 Lb. - - 5.75 12 Double Baited Ant Traps Free
50 Lb. - - 9.75 6 Ant Jelly Tubes Free
100 Lb. - - 19.00 12 Ant Jelly Tubes Free
All Goods Shipped Freight or Express?—F. O. B. New York
Good only if ad inclosed and signed: .....
F. LUCAS
174 WEST 65 STREET NEW YORK, N. Y.

National Association Notices

Members are urged to call on each other, especially when traveling about the country. A permanent office is not required, but for those firms visiting New York City, it is urged that the secretary be called at either South 8-4120 or South 8-4121 and appointment will be arranged.

National Seal: It is gratifying to notice the general use of the seal on letterheads, advertising and classified telephone directory advertising. If you have not ordered your cut, do so immediately. Cuts are provided in two sizes, ½x¾" and ¾"x1". The charge is $1.00 per cut or if two or more are ordered at the same time, $1.00 for the first cut and 50c for each additional cut. No orders filled without check or money order accompanying. All orders for seals must be sent directly to the secretary of the association at 3019 Fort Hamilton Parkway, Brooklyn, New York.

Rodent Menace Over, So Britain Sacks Cats

London.—British postmasters received a sharp warning recently from the home office regarding the number of cats in their employ. The emergency which threatened postoffices with a rodent invasion at the outbreak of the war is over, it is pointed out, and official salaried rat catchers will take over shortly where the cats left off.

The warning comes on the eve of the general postoffice annual cat staff census, in which the following three questions will be asked: (A) Is an official cat still retained on the premises (B) Is the authorized weekly allowance of one shilling still claimed? (C) Is a cat still necessary?—N. Y. Herald-Tribune.

G & S
RAT GLUE

Offered to you for a limited time at
REDUCED PRICES!

50 lbs. formerly 35c *Now* **27c** per lb.
25 lbs. formerly 38c *Now* **29c** per lb.

F.O.B. Brooklyn, New York

Guaranteed for Uniform Quality

Mfg. and Dist. by
G & S Exterminating Supply Co.
140 NOSTRAND AVENUE
BROOKLYN, NEW YORK

Free Literature on Request

WRITE FOR THESE BOOKLETS

The latest helpful information service literature will be sent to you without cost or obligation. If in addition there are any particular pieces of literature offered by advertisers in this issue you are interested in receiving, either write them direct, or if you prefer, please send us such requests.

Please note, however, that you must request each booklet on a separate letterhead though they must all be mailed in one envelope addressed to Pests, 126 Lexington Avenue, New York City, N. Y.

LATEST BULLETINS

Powder bulbs, respirators, gas masks, aprons, gloves, etc.

WRITE PESTS—General.

SAFE FUMIGATION PRACTICES.

Worthwhile bulletin for office posting and kit use which discusses safe fumigation practices; what to do and not to do and causes of accidents statistically arranged.

WRITE PESTS—American.

DOG AND CAT CHASER

Descriptive literature of product that keep dogs and cats away from shrubbery, porches, etc. Corrects most all troubles and annoyances caused by animals. It is not poisonous and will not harm animals or plants.

WRITE PESTS—Lag Products.

BIRD REPELLENT SERVICE

Information covering new bird repellent service you can offer to keep buildings free from pigeons, starlings and other roosting birds.

FOR COMPLETE DETAILS WRITE PESTS—Bird.

OUTLINE OF USES AND RECOMMENDATIONS FOR ROTENONE DUSTS AND SPRAYS

By W. J. Haude, Entomologist

The object of this memorandum is to summarize for insecticide manufacturers and other interested persons some of the more important agricultural uses of rotenone-bearing insecticides. In all cases recommendations are based on those emanating from official state and federal experiment stations unless otherwise noted.

YOUR COPY MAY BE HAD BY ADDRESSING POWELL, c/o PESTS.

PARADICHLOROBENZENE PRODUCTS

Circular describing bowl deodorant with aluminum wire hanger; bowl deodorant with wire hanger; moth vaporizer; microphone moth vaporizer; moth vapor bomb; vaporizer refill; paradichlor nuggets or crystals, etc. Write Greenpoint, c/o PESTS.

PLANT INSECTICIDE

Circular matter describing complete rotenone liquid spray packaged for resale to backyard gardeners. Useful in control of both sucking and chewing insects such as aphids, thrips, Japanese beetles, Mexican bean beetles and leafhoppers.

WRITE PESTS—Cubor.

TORNADO ELECTRIC SPRAYERS

Descriptive literature of electric sprayers made to order for pest control work. Manufacturer states sprayers give fast, economical spraying, plus rugged durable construction. Special air volume control for regulating spray, adjustable nozzles, perfect balance and patented warming action which produces maximum kill from your insecticide. Seven models, from one pint to 1 gallon capacity, both compressor and blower type.

WRITE PESTS, Tornado.

SOLVAY PRODUCTS

48-page booklet in colors and illustrated, covering their entire line of Alkalies and Special Products, with a special section dealing with Para-Dichlorobenzene and Ortho-Dichlorobenzene.

FREE COPY MAY BE HAD BY PEST CONTROL OPERATORS. WRITE SOLVAY, c/o PESTS.

Lag's Dog & Cat Chaser
The Stainless Repellent With a Pleasant Odor
Attractive money making proposition for dealers. 25c-50c-$1.50-$2.50-$7.50 and in bulk.
G. ANDERSON LEVY, *Manufacturer*
631 Penn Ave. Pittsburgh, Pa.

Exterminators everywhere —Get Quick Service Here. Powder Bulbs, Respirators, Gas Masks, Aprons, Gloves, etc. Write now for latest bulletins.
GENERAL SCIENTIFIC INDUSTRIES
2735 N. Broad Street
Philadelphia, Pa.

1940 Brush Catalog!
READY
Our new 1940 brush catalog is now ready for distribution. We show the most complete line of brushes in the U. S., including floor brushes and miscellaneous items for the janitor trade. Ask for your copy of this big catalog today.
FLOUR CITY BRUSH CO.
MINNEAPOLIS MINNESOTA
PACIFIC COAST BRUSH CO.
LOS ANGELES CALIFORNIA

Join the ranks NOW of satisfied users of the

TOX-EOL SYSTEM
of TERMITE CONTROL

Over 150 Licensed Operators now use TOX-EOL with profit and satisfaction.

YOUR TERRITORY MAY STILL BE OPEN

The TOX-EOL SYSTEM is a combination of ground and wood treatment using chemicals which have been long and thoroughly tested with amazing results!

ODORLESS! STAINLESS! EFFECTIVE!

WITH THE
TOX-EOL SYSTEM
YOU CAN GIVE BETTER SERVICE!
SELL MORE JOBS!
MAKE MORE MONEY!
DEFY ALL COMPETITION!

FIVE YEAR WARRANTY BOND
Participated in by the manufacturer—available to one licensed Termite Control Operator in a community.
WRITE FOR COMPLETE DETAILS

GET OUR LOWER PRICES ON
PHOSPHORUS PASTE for Rodents and Roaches—RED SQUILL EXTRACT, Non-Poisonous Killer of Rats and Mice.
GUARANTEED ANALYSIS

CRE-O-TOX CHEMICAL PRODUCTS CO.
MADISON AT WILLETT — MANUFACTURERS OF PEST CONTROL CHEMICALS — MEMPHIS, TENN.

BETTER KILLS — BETTER JOBS — BIGGER PROFITS

For Fumigating Use ZYKLON DISCOIDS

No more guesswork. Do better jobs with this handy packaged fumigant. ZYKLON DISCOIDS are ready for instant use. Open the can and scatter the discs into rooms to be fumigated. No corrosive liquids and no dangerous residue. DISCOIDS give off a powerful gas that penetrates into every crack and crevice—kills insects wherever they may be. Send for "Zyklon Discoids Fumigation Manual"—FREE.

For Rat Control Use CYANOGAS

This is a powder giving off a gas —NOT A BAIT. Kills rats and mice *instantly*. Successful where baits and other means fail. Simply pump the powder into the rat holes. The gas liberated penetrates to all parts of the runs. With a Cyanogas-Foot-Pump-Duster and CYANOGAS A-DUST you can make big profits. Special ruggedly built duster $5.75. Write for free booklet on rodent control.

American Cyanamid & Chemical Corporation
Insecticide Department
30 ROCKEFELLER PLAZA, NEW YORK, N. Y., KANSAS CITY, MO.; AZUSA, CALIF.

Three Products of Research

HI-TOX 20

A NEW SYNTHETIC CONCENTRATE - NOTHING TO ADD - USE AS IT IS

Odorless
Non-Poisonous
Non-Irritating

Higher Killing
Quicker Knock Down
Greater Repellency

Dilution: 1-24 grade B insecticide
1-19 grade A insecticide

SUPER MORTICIDE No. 25

A COMPLETELY ODORLESS AND EFFICIENT BED-BUG CONCENTRATE

What it is:

SUPER MORTICIDE No. 25 has as its basic material the same ingredients as our regular MORTICIDE 24-1, the same killing properties so well known to all who have used it, only SUPER MORTICIDE does not have any odor or smell whatsoever. Besides, SUPER MORTICIDE No. 25 contains Rotenone from Derris Root and other Derris extractives, properly compounded to stay in a complete solution in the finished bed-bug spray.

This spray is non-poisonous and will not injure any material. It will not tarnish metal or ruin varnish or paint.

SUPER MORTICIDE No. 25 has lightning killing power, destroying not only bed-bugs but petrifying their eggs.

SUPER MORTICIDE No. 25 is always uniform and reasonably priced.

Dilution: 1-24—or one gallon will make 25 gallons of finished spray

Samples and Information on Hi-Tox 20 and Super Morticide 25 on Request

LET LLOYD'S OF LONDON INSURE YOUR MOTHPROOFING JOBS

INCREASE YOUR MOTHPROOFING BUSINESS
WITH THE INSURED MOTHPROOFING COMPOUND

"MORTOLIN"

"400" Pest Control Operators Cannot Be Wrong:

And Why? . . . Because every job completed with "Mortolin" by the professional mothproofer is covered by an insurance policy of $2,000, issued by Lloyd's of London, the largest insurance company of its kind in the world.

"MORTOLIN" is

1. *A killer, repeller and MOTHPROOFER.*
2. *Oil Soluble.*
3. *Non-Poisonous.*
4. *Odorless.*
5. *Highly Concentrated.*
6. *Economical.*

This Product Has Been Marketed for Over Eleven Years with Competent Results.

Act Now . . . Write for Details

ASSOCIATED CHEMISTS, INC.
6243 SOUTH ASHLAND AVENUE
CHICAGO, ILLINOIS